The FOUNDRY

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MAY, 1939

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EDITORIAL PAGES REMOVED

Editorial

Cincinnati Meeting Completes Successful Year

THE Forty-third annual convention of the American Foundrymen's association, to be held in Cincinnati, May 15 to 18, provides the climax for a most successful year of association activities. Since the annual meeting in Cleveland a year ago, the A. F. A. has grown in members, in scope of endeavor, and most of all in the service rendered, not only to its members, but to the entire foundry industry of the country. Hundreds of men and women have contributed willingly of their talents to permit the association to realize its objective "To promote the arts and sciences applicable to metal casting manufacture and to improve methods of production and quality of castings to the end that increasing utility of all classes of castings may result advantageously to all persons engaged in the foundry and related industries and to all users of foundry products."

Enthusiasm in the activities of the chapters of the A. F. A. has continued to grow. During the past 12 months, the Michiana chapter, Cincinnati District chapter and the Central New York chapter were added to the 14 association chapters previously functioning. Chapter programs have attracted more widespread interest, with the result that well in excess of 2000 men, vitally interested in the problems of the foundry industry, are meeting monthly in 17 different locations throughout the country to become better acquainted and to partake of practical and technical knowledge. Including social events and outings, the yearly attendance at A. F. A. chapter meetings will exceed 20,000.

Since last September, chapters and local foundrymen's associations have staged nine regional foundry conferences in which the A. F. A. participated. The association also held its second Fall Technical conference for the discussion of the more highly technical problems. On the whole, the programs presented at these conferences were excellent and the attendance in several instances broke all previous records. Total attendance at the ten meetings was in the neighborhood of 3000.

Space does not permit a review of all the association accomplishments but mention should be made of the recent distribution of the fourth edition of *Testing and Grading Foundry Sands and Clays*, and the early publication of *Alloy Cast Irons* and the second edition of the *Cast Metals Handbook*.

The entire program for the Cincinnati convention is of such high quality as to justify the attendance of the great majority of the association members. Through the co-operation of hundreds of individuals and industrial concerns, a group of technical papers, committee reports and practical discussions has been assembled covering practically every phase of casting manufacture. A review of recent progress and an indication of future trends will feature the Cincinnati meeting.

Convention visitors should derive much pleasure from the special entertainment features arranged by committees from the Cincinnati District chapter of the A. F. A. The plant visitation program provides an organized inspection of the Cincinnati Milling Machine Co. on Monday, as well as special visits to the Wheeling Steel Co., Portsmouth, O. and the Hamilton Coke & Iron division of the American Rolling Mill Co., Hamilton, O. The committee has arranged that many foundries of the district will receive convention visitors during the three and a half days of the convention. The annual dinner featuring the awarding of three gold medals for distinguished service to the industry and the association, and the reception and dance to follow, will highlight the social program of the annual meeting.

The hospitality of the Queen City beckons.

Co-operative Effort Needed

PROPERLY selling engineers on availability of modern gray irons for almost every purpose remains the greatest task facing the gray iron foundry industry today. Remarkable progress in development of gray cast iron in recent years still awaits translation into a real sales advantage.

Although a few progressive foundries are doing an excellent job, the undertaking is of such magnitude as to require the co-operative effort of all gray iron producers. The Gray Iron Founders society has made a real start through the recent compilation of engineering data on gray cast iron. The support of all the industry now is needed.

For self advancement, if not for self preservation, every gray iron foundry should get behind the sales promotional program of the Gray Iron Founders society. Attendance at the business meeting of that organization at Cincinnati on Monday morning, May 15, should provide an excellent starting point.

Frank G. Steinebach
Editor

CINCINNATI, thriving center of industry and commerce, will welcome the foundrymen of North America when the American Foundrymen's association stages its Forty-third annual convention in the Queen City, May 15 to 18. Committees of the recently organized Cincinnati District chapter of the A. F. A. have arranged a variety of entertainment features, which will add greatly to the enjoyment of the annual gathering of foundrymen. Local committees have been organized under the direction of George A. Seyler, Lunkenheimer Co., general chairman, and Ray J. Redmond, Buckeye Foundry Co., general vice chairman. The complete Cincinnati committee roster is presented on page 28.

Exceptional facilities for foundry plant visitation are offered in the Cincinnati district. The plant visitation committee, with Philip W. Cone, Cincinnati Milling Machine Co., as chairman and Lawrence A. Gosiger, S. Obermayer Co., as vice chairman, has arranged for three organized plant visits, and at the same time has prepared a list of foundries which will be open for inspection by convention visitors during the convention week. A special inspection tour of the Portsmouth, O., plant of the Wheeling Steel Corp. has been arranged for Sunday, May 14. The party will leave the Hotel Gibson at 8:30 a. m., will inspect the entire plant, have luncheon at the Portsmouth Country club and return to Cincinnati in the evening. Those wishing to make the trip are asked to make reservations with Alex B. Hawes, 2901 Carew tower, Cincinnati, not later than Saturday morning, May 13.

All convention visitors should find the special organized plant visit on Monday afternoon of unusual interest and exceptional value. All technical sessions will close at noon to permit everyone in attendance at the convention to visit the plant of the Cincinnati Milling Machine Co. Transportation will be supplied from downtown hotels to and from the plant and the various departments of the plant will be visited. An interesting description of the foundry of the Cincinnati

The view on the opposite page was taken from the Kentucky side of the Ohio river and shows a portion of downtown Cincinnati. The Cincinnati Union Terminal, at the right, is one of the finest in the world

Milling Machine Co. providing a preview of the Monday afternoon visit, appears on page 36 of this issue of THE FOUNDRY.

Following the close of the convention Thursday noon, a special visit to the plant of the Hamilton Coke & Iron division of the American Rolling Mill Co., Hamilton, O., has been arranged. The inspection trip will include the blast furnace and coke plant at Hamilton or the continuous strip mill at Middletown and will be followed by a buffet supper at the country club. The ladies will be entertained at the country club while the men inspect the plant. Transportation from Cincinnati to Hamilton and return will be supplied upon request.

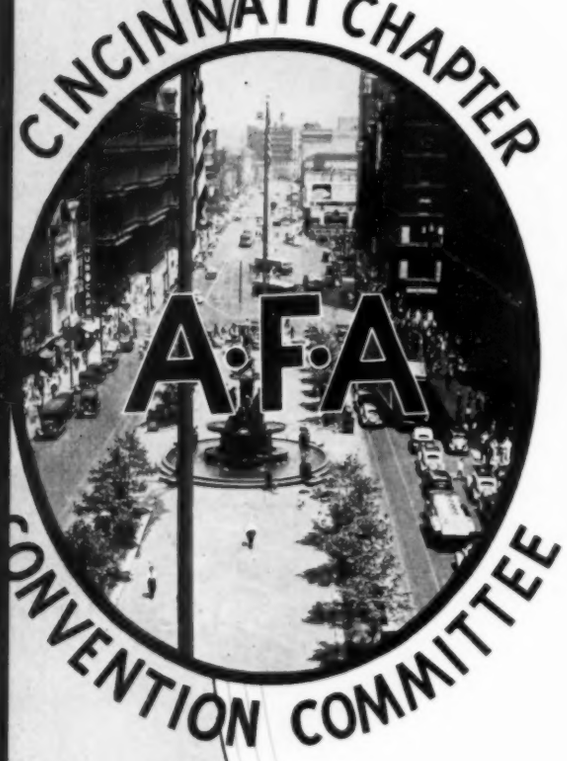
During the convention the following plants will be open for inspection: Buckeye Foundry Co.; Cincinnati Steel Castings Co.; Edna Brass Mfg. Co.; General Machinery Co.; Griffin Wheel Co.; Hamilton Foundry & Machine Co.; Lunkenheimer Co.; Magnus Metal Corp.; Oberhelman Ritter Co.; Ohio Pattern Works & Foundry Co.; Peerless Foundry Co.; N. Ransohoff, Inc.; Sawbrook Steel Castings Co.; Wheeling Steel Co.; D. T. Williams Valve Co.; and Williamson Heater Co. Detailed information on plant visitation schedules and directions for reaching the various plants open for inspection will be available at the plant visitation committee headquarters at the Hotel Gibson.

An unusually attractive program of entertainment has been arranged for the ladies attending the convention. Plans have been prepared by a committee with Ray J. Redmond as chairman. Registration and ladies' headquarters will be maintained in the Netherlands-Plaza hotel. A reception and tea will be held at that hotel Monday from 3 to 5 p. m. with the compliments of the American Foundrymen's association.

On Tuesday, May 16 the ladies will leave the Netherlands-Plaza hotel in busses at 10 a. m. for a visit to the Taft museum. This will be followed by a luncheon served at Netherlands-Plaza hotel and in the afternoon the group will be taken in busses to Crosley field where they will witness a baseball game.

On Wednesday, May 17, the ladies will be taken to Fox and Crow for a luncheon, the busses leaving the Netherlands-Plaza hotel at 12 noon and returning at 4 p. m. The annual A. F. A. dinner and dance will be held at the Hotel Gibson Wednesday evening. The committee has accepted the suggestion of several that no planned features be arranged for Wednesday and Thursday mornings so that the ladies may have time to visit the various shopping centers and other points of interest in the city of Cincinnati. All of the events

(Continued on page 34)



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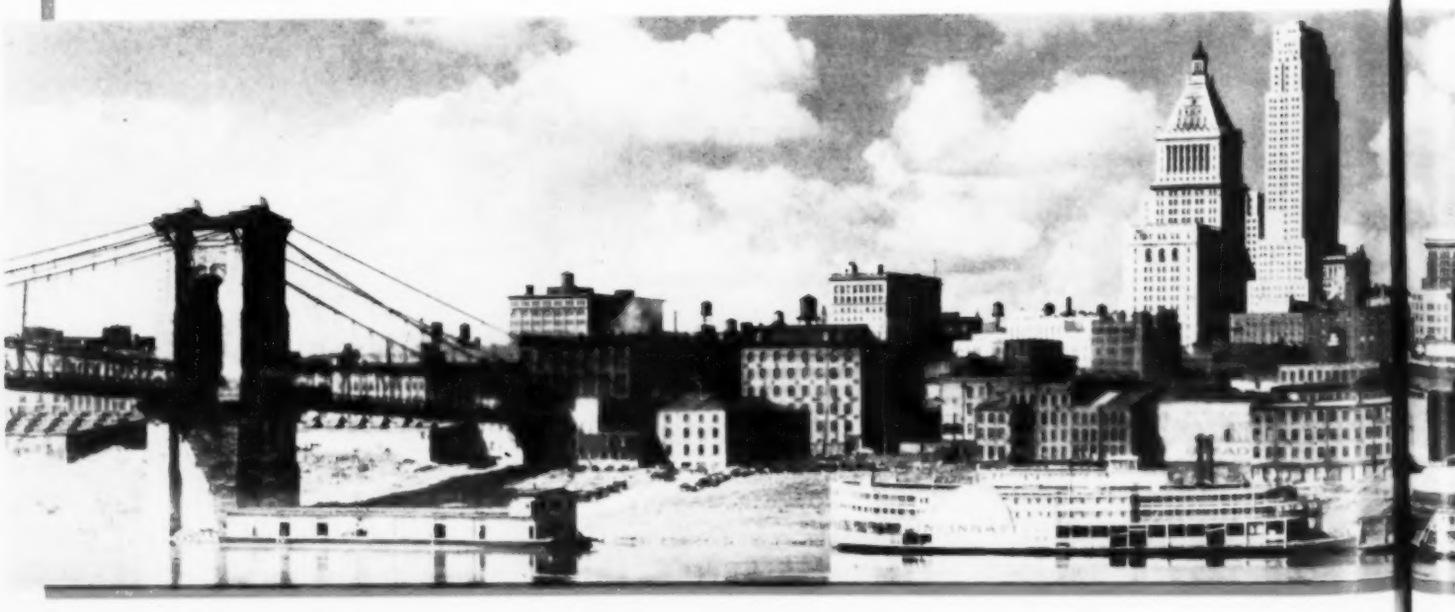

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L. A. Gosiger

Monday, May 15

Registration—Members, Hotel Gibson, Foyer, Ball Room Floor
Ladies, Netherland Plaza

10:00 a. m.—Opening Session

Presiding — President Marshall Post, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.

10:30 a. m.—Malleable Cast Iron

Chairman—J. H. Lansing, Malleable Founders' society, Cleveland

Atmospheres for Malleable Iron Annealing—Their Properties and Applications, by John Dow, Holcroft & Co., Detroit.

White Iron for Malleablizing, by J. O. Klein, Texas Foundries Inc., Lufkin, Texas

The Shearing of Malleable Iron Gates, by S. D. Martin, Saginaw Malleable Iron division, General Motors Corp., Saginaw, Mich.

10:30 a. m.—Nonferrous

Chairman—William M. Ball Jr., Edna Brass Mfg. Co., Cincinnati. Co-Chairman—C. O. Thieme, H. Kramer & Co., Chicago.

Production of Bronze Pressure Castings, by D. Frank O'Connor, Walworth Co., Boston.

Crucible Melting, by G. K. Eggleston, Detroit Lubricator Co., Detroit.

10:30 a. m.—Gray Iron Shop Course—Session 1

Chairman—R. F. Hine, Studebaker Corp., South Bend, Ind.

Cupola Practice, Discussion Leader—Donald J. Reese, International Nickel Co., New York.

2:00 p. m.—Special Works Visit to Cincinnati Milling Machine Co.

6:30 p. m.—Malleable Round Table—Dinner

Chairman—L. N. Shannon, Stockham Pipe Fittings Co., Birmingham, Ala. Co-Chairman—P. C. DeBruyne, Moline Malleable Iron Co., St. Charles, Ill.

Informal Discussion on Current Practices

8:00 p. m.—Materials Handling

Chairman—E. W. Beach, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich. Co-Chairman—James Thomson, Continental Roll & Steel Foundry Co., East Chicago, Ind.

Mold Equipment, by W. R. Jennings, John Deere Tractor Co., Waterloo, Iowa.

Some Tests on the Effectiveness of Water Under High Pressure for Cleaning Castings, by R. Webster, Hydroblast Co., Chicago.

8:00 p. m.—Nonferrous

Chairman—Harold J. Roast, Canadian Bronze Co., Montreal. Co-Chairman—William J. Laird, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Effects of Aluminum and Antimony on the Physical Properties of Red Cast Brass (85-5-5-5), by H. B. Gardner and C. M. Saeger Jr., Bureau of Standards, Washington.

High Conductivity Copper Castings, by A. B. Kinzel, Union Carbide & Carbon Research Laboratories, New York.

Nonferrous Division Annual Business Meeting

8:00 p. m.—Lecture Course—Session 1

Chairman—H. Bornstein, Deere & Co., Moline, Ill.

The Microscope in Elementary Cast Iron Metallurgy, by R. M. Allen, Bloomfield, N. J.

Tuesday, May 16

9:00 a. m.—Gray Iron Shop Course—Session 2

Chairman—P. T. Bancroft, Moline, Ill.

Production of Uniform Dense Structures in High Test and Alloy Iron Castings, by M. A. Scott, Greenlee Foundry Co., Chicago.

10:00 a. m.—Malleable

Chairman—C. F. Joseph, Saginaw Malleable Iron division, General Motors Corp., Saginaw, Mich. Co-Chairman—Richard Schneidewind, University of Michigan, Ann Arbor, Mich.

Effects of Manganese on Second Stage Graphitization, by D. P. Forbes, Gunite Foundries, Rockford, Ill.

Hydrogen in Solid White Cast Iron, by H. A. Schwartz and G. M. Guiler, National Malleable & Steel Casting Co., Cleveland.

10:00 a. m.—Gray Cast Iron

Chairman—F. J. Walls, International Nickel Co., Detroit. Co-Chairman—W. R. Jennings, John Deere Tractor Works, Waterloo, Iowa.

A Scientific Approach to a Foundry Problem, by L. A. Danse, Cadillac Motor Car Co., Detroit.

Sixty Thousand-Pound Cupola Iron, by E. L. Roth, Motor Casting Co., Milwaukee.

Castings for the British Gas Industry, by F. Whitehouse, Newton, Chambers & Co., Ltd., Chapeltown, England (Official Exchange Paper—Institute of British Foundrymen)

10:00 a. m.—Nonferrous

Chairman—H. M. St. John, Crane Co., Chicago. Co-Chairman—William Romanoff, H. Kramer & Co., Chicago.

The Foundry and Metallurgical Science, by M. G. Corson, New York.

Influence of Pouring Ladles on Quality of Red Brass, by R. W. Parsons, Ohio Brass Co., Mansfield, O.

10:00 a. m.—Apprentice Training

Chairman—J. E. Goss, Brown & Sharpe Mfg. Co., Providence, R. I.

Apprentice Training, by Herman K. Ewig, Cincinnati Milling Machine Co., Cincinnati.

Foundry Apprenticeship, by M. J. Gregory, Caterpillar Tractor Co., Peoria, Ill.

12:30 p. m.—Nonferrous Round Table—Luncheon

2:00 p. m.—Safety and Hygiene

Chairman—L. C. Wilson, Reading Steel Casting division, American Chain & Cable Co., Reading, Pa.

The Establishment of a Safety and Hygiene Program in a Small Foundry, by P. E. Rentschler, Hamilton Foundry & Machine Co., Hamilton, O.

The Open House and Public Relations, by W. H. Doerfner, Saginaw Malleable Iron division, General Motors Corp., Saginaw, Mich.

2:00 p. m.—Castability of Metals

Chairman—W. H. Spencer, Sealed Power Corp., Muskegon, Mich. Co-Chairman—George P. Halliwell, H. Kramer & Co., Chicago.

Castability of Cast Steel, by C. H. Lorig and E. C. Kron, Battelle Memorial institute, Columbus, O.

Effects of Superheating on the Castability and Physical Properties of Gray Iron, by N. A. Ziegler and H. W. Northrup, Crane Co., Chicago.

The Measurement of the Fluidity of Aluminum Alloys, by L. W. Eastwood, Aluminum Co. of America, Cleveland.

Malleable Iron Castability Tests, by E. J. Ash, University of Michigan, Ann Arbor, Mich.

4:00 p. m.—Lecture Course—Session 2

Chairman—G. P. Phillips, International Harvester Co., Chicago.

The Microscope in Elementary Cast Iron Metallurgy, by R. M. Allen, Bloomfield, N. J.

6:00 p. m.—Engineering Instructors' Dinner

Presiding—F. G. Sefing, International Nickel Co., New York.

8:00 p. m.—Refractories

Chairman—E. J. Carmody, C. C. Kawin Co., Chicago. Co-Chairman—A. H. Dierker, Ohio State university, Columbus, O.

Plastic Cupola Patching, by R. E. Wilke, John Deere Tractor Co., Waterloo, Iowa.

Refractories in the Steel Foundry, by A. V. Leun, Bethlehem Steel Co., Bethlehem, Pa.

8:00 p. m.—Time Study

Chairman—Frank Wartgow, American Steel Foundries, East Chicago, Ind. Co-Chairman—H. C. Robson, Continental Roll & Steel Foundry Co., East Chicago, Ind.

Practical Approach to Motion and Time Study, by G. J. Stegemerten, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Wednesday, May 17

8:00 a. m.—Gray Iron Shop Course—Session 3

Chairman—K. H. Priestley, Eaton-Erb Foundry Co., Vassar, Mich.

Cupola Refractories and Figuring Mixes, Discussion Leader—J. A. Bowers, American Cast Iron Pipe Co., Birmingham, Ala.

Tentative Program Of Convention Activities

9:00 a. m.—Gray Iron

Chairman—James T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala. Co-Chairman—W. A. Hambley, Allis-Chalmers Mfg. Co., Milwaukee.

Rapid Temperature Measurements of Cast Iron with an Immersion Thermocouple, by F. Holtby, University of Minnesota, Minneapolis.

Copper-Aluminum-Silicon Alloy Additions to Cast Iron, by V. H. Schnee and T. Barlow, Battelle Memorial institute, Columbus, O.

Influence of Undercooling on the Graphite Pattern of Gray Iron, by Richard Schneidewind and C. D'Amico, University of Michigan, Ann Arbor, Mich.

9:00 a. m.—Foreman and Apprentice Training

Chairman—A. D. Lynch, J. I. Case Co., Racine, Wis. Co-Chairman—V. J. Hydar, Milwaukee.

Foundry Apprentice Training—An Essential to Foreman Training, by A. R. Luebke, Fairbanks, Morse & Co., Beloit, Wis.

A Foundryman's Approach to Foreman Training, by W. G. Conner Jr., Walworth Co., Greensburg, Pa.

9:00 a. m.—Steel

Chairman—J. W. Bolton, Lunkenheimer Co., Cincinnati. Co-Chairman—W. C. Hartmann, Bethlehem Steel Co., Bethlehem, Pa.

High Alloy Steel Castings for Heat and Corrosion Resistance, by James Corfield, Michigan Steel Castings Co., Detroit.

Report of Committee on Impact Tests

Report of Committee on Radiography

Gamma-Ray Radiographic Standards of U. S. Navy for Steel Castings for Pressure Service, by N. A. Kahn, New York Navy Yard.

Copper as an Alloying Element in Some Cast Steels, by C. T. Greenidge and C. H. Lorig, Battelle Memorial institute, Columbus, O.

9:00 a. m.—Sand Research

Chairman—H. S. Washburn, Plainville Casting Co., Plainville, Conn. Co-Chairman—W. G. Reichert, Singer Mfg. Co., Elizabeth, N. J.

Properties of Resin Bonded Cores, by Emile Pragoff Jr., Hercules Powder Co., Wilmington, Del.

Hot Strength and Collapsibility of Foundry Sands, by H. W. Dietert and E. E. Woodliff, Harry W. Dietert Co., Detroit.

11:00 a. m.—Annual Business Meeting and Board of Awards Lecture

Chairman—President Marshall Post

Business Management Has a Job, by Fred H. Clausen, Van Brunt Mfg. Co., Horicon, Wis.

2:00 p. m.—Steel

Chairman—John Howe Hall, Philadelphia. Co-Chairman—D. C. Zuege, Sivyer Steel Casting Co., Milwaukee.

A Rapid Method for Determining Carbon in Plain Carbon Steels for Control Purposes, by H. H. Blosjo, Minneapolis Electric Steel Foundry, Minneapolis.

A Discussion on Steel Castings Having High Mechanical Properties, by George Delbart, Societe Francaise de Constructions Mecaniques, Paris, France. (Official Exchange Paper—Association Technique de Fonderie de France).

Report of Committee on Heat Treatment

Synthetic Bonded Steel Molding Sands, by C. W. Briggs, Steel Founder's Society of America, Cleveland, and R. E. Morey, Naval Research Laboratory, Anacostia, D. C.

Report of Committee on Coupon Tests

2:00 p. m.—Sand Research

Chairman—H. S. Washburn, Plainville Casting Co., Plainville, Conn. Co-Chairman—W. G. Reichert, Singer Mfg. Co., Elizabeth, N. J.

Elements of Petrographic Study of Molding Sands, by R. E. Grim, Illinois Geological Survey, Urbana, Ill.

Mineral Composition and Textures of the Clay Grade of Molding Sand, by C. E. Schubert, University of Illinois, and R. E. Grim, Illinois Geological Survey, Urbana, Ill.

Report of Sand Research Committee

2:00 p. m.—Foundry Costs

Chairman—R. L. Lee, Liberty Foundry Co., Wauwatosa, Wis.

Molding Costs—Committee Report

Melting Costs—Committee Report

4:00 p. m.—Lecture Course—Session 3

Chairman—Horace Deane, Deere & Co., Moline, Ill.

The Microscope in Elementary Cast Iron Metallurgy, by R. M. Allen, Bloomfield, N. J.

7:00 p. m.—A. F. A. Annual Dinner

Presentation of Medal Awards
Address
Reception and dance.

Thursday, May 18

9:00 a. m.—Gray Iron Shop Course—Session 4

Chairman—J. A. Woody, American Cast Iron Pipe Co., Birmingham, Ala.

Cupola Operation, by John Lowe, Lansing, Mich.

9:30 a. m.—Steel—Symposium on Melting Practices

Chairman—T. N. Armstrong, International Nickel Co., New York. Co-Chairman—John Howe Hall, Philadelphia.

Acid Electric, by W. G. Finster, Reading Steel Castings division, American Chain & Cable Co., Reading, Pa.

Basic Electric, by C. W. Briggs, Steel Founders' Society of America, Cleveland.

Basic Open Hearth, by J. W. Porter, American Steel Foundries, East Chicago, Ind.

Acid Open Hearth, by W. C. Harris, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.

Converter, by F. B. Skeates, Link-Belt Co., Chicago.

Induction Furnace, by G. F. Landgraf, Lebanon Steel Foundry, Lebanon, Pa.

10:00 a. m.—Gray Iron

Chairman—A. L. Boegehold, General Motors Corp., Detroit. Co-Chairman—L. H. Rudesill, Griffin Wheel Co., Chicago.

Influence of Composition on the Physical Properties of Gray Iron, by R. G. McElwee, Vanadium Corp. of America, Detroit, and Richard Schneidewind, University of Michigan, Ann Arbor, Mich.

Some Factors in Hardening and Tempering Gray Cast Iron, by V. A. Crosby, G. A. Timmons, and A. J. Herzig, Climax Molybdenum Co., Detroit.

Effects of Heat Treatment on Combined Carbon and Physical Properties of Cast Iron, by S. C. Massari, Association of Manufacturers of Chilled Car Wheels, Chicago.

10:00 a. m.—Pattern Making

Chairman—Vaughan Reid, City Pattern Works, Detroit. Co-Chairman—H. M. Harrold, Caterpillar Tractor Co., Peoria, Ill.

Some Pattern Making Problems, by J. A. Kolb, Caterpillar Tractor Co., Peoria, Ill.

12:30 p. m.—Gray Iron Division—Luncheon

12:30 p. m.—Steel Division Round Table—Luncheon

Chairman—A. H. Jameson, Malleable Iron Fittings Co., Branford, Conn. Co-Chairman—T. N. Armstrong, International Nickel Co., New York.

Deoxidizers, Discussion Leaders—C. E. Sims, Battelle Memorial institute, Columbus, O., and A. P. Gagnebin, International Nickel Co., Bayonne, N. J.

Reduction of Silicon from Slag, Discussion Leaders—D. C. Zuege, Sivyer Steel Casting Co., Milwaukee, and H. H. Blosjo, Minneapolis Electric Steel Casting Co., Minneapolis.

2:00 p. m.—Special Plant Visitation Trip

Hamilton Coke & Iron division, American Rolling Mill Co., Hamilton, O. (Blast Furnaces and Coke Ovens)—Buffet Supper, Hamilton Country Club.

(*Continued from page* 27)

with the exception of the tea on Monday will be provided with the compliments of the Cincinnati District chapter of the American Foundrymen's association.

As previously mentioned, the annual dinner of the American Foundrymen's association will be held on Wednesday evening, May 17, in the roof garden of the Hotel Gibson. The feature of the banquet will be the presentation of three gold medals for outstanding service to the industry and the association. The John A. Penton medal will be presented to Harold S. Falk, vice president, Falk Corp., Milwaukee, in recognition of his leadership in promoting foundry apprentice training. The W. H. McFadden medal will be presented to Donald J. Campbell, president, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., in recognition of the achievements of that company in developing casting manufacturing processes. The J. H. Whiting medal will be presented to James R. Allen, assistant manager, industrial engineering and construction department, International Harvester Co., Chicago, in recognition of his engineering contributions to the association and the industry. The social event of the convention, a reception and dance arranged by a local committee under the chairmanship of Herman K. Ewig, Cincinnati Milling Machine Co., will follow the annual dinner.

The famous Fountain square of Cincinnati through the shadows

The technical program of the convention, presented on pages 32 and 33 of this issue, covers an exceptionally wide range of papers and committee reports dealing with practically all phases of castings manufacture. The program includes well over 30 sessions devoted to problems of production, technical control, management and materials, in steel, malleable, gray iron and nonferrous foundries. Special attention is being paid to training methods for apprentices and foremen and plans of the Walworth Co., Caterpillar Tractor Co. and Fairbanks, Morse & Co. and the Cincinnati Milling Machine Co. will be discussed.

Shop operation courses, as has been the case in recent conventions, will provide an interesting forum for the discussion of problems on cupola practice. In Cincinnati the courses will be arranged by the gray iron division of the association. An innovation this year is a 3-session instructional course on "Microscope in Elementary Cast Iron Metallurgy." The course will be given by Roy M. Allen, metallurgical consultant, Bloomfield, N. J.

Nonferrous Foundrymen Get Together

The nonferrous division under the chairmanship of Harold J. Roast, Canadian Bronze Co., Montreal, has organized a social get together dinner for Tuesday evening, May 16. As a special attraction for the members and their ladies, an address will be presented by William B. Stout, president, Stout Engineering Laboratories, Dearborn, Mich. on the subject "The Romance of Aviation." For the first time in many years the steel division is giving special attention to a comparison of melting practices in different types of furnaces, namely, acid and basic open hearth, acid and basic electric, converter and induction. Each process will be treated by an authority in his field.

The matter of public relations will be given considerable attention. The factor of the open house and establishing acquaintanceship and good public relations will be discussed by Peter E. Rentschler, president, Hamilton Foundry & Machine Co., Hamilton, O., and W. H. Doerfner, manager, Saginaw Malleable Iron division, General Motors Corp., Saginaw, Mich.

Fred H. Clausen, president, Van Brunt Mfg. Co., Horicon, Wis., has been chosen by the board of awards to present the second annual awards lecture at the annual business meeting. Mr. Clausen has chosen as the subject of his address—"Business Management Has A Job." Mr. Clausen is vice president of the chamber of commerce of the U. S. A., a past president of the Wisconsin Manufacturers' association and board of regents, University of Wisconsin. He is chairman of the board, Holeproof Hosiery Co. and director of Deere & Co., and vice presi- (*Please turn to page* 97)

A·F·A

Awards Three Gold Medals

THE board of awards of the American Foundrymen's association recently announced that three major medal awards will be made during the Forty-third annual convention to be held in Cincinnati May 15-18. At the annual dinner on Wednesday evening the J. H. Whiting gold medal will be awarded to James R. Allan, assistant manager of the engineering and construction department, International Harvester Co., Chicago, in recognition of his engineering contributions to the association and the foundry industry; the W. H. McFadden gold medal to Donald J. Campbell, president Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., in recognition of outstanding accomplishments of his company in casting manufacturing processes; and the John A. Penton gold medal to Harold S. Falk, vice president and general manager, Falk Corp., Milwaukee, in recognition of his leadership in promoting interest in foundry apprentice training.

The board of awards of the association, consisting of the last seven living past presidents, controls the awarding of the four gold medals made possible by a fund established in 1924 through contributions of four past officers of the association whose names are identified with the medals, namely, Joseph S. Seaman, third president; W. H. McFadden, tenth president; John A. Penton, first secretary, and J. H. Whiting, vice president in 1906. The present chairman of the board of awards is Hyman Bornstein, director of laboratories, Deere & Co., Moline, Ill. The six other past presidents serving on the board with Mr. Bornstein are: James L. Wick Jr., Dan M. Avey, Frank J. Lanahan, T. S. Hammond, E. H. Ballard and N. K. B. Patch.

The award to James R. Allan is based on his outstanding service to the association over many years as a committee leader along engineering lines, developing standards for refractories and codes of recommended practices applying to dust suppression equipment. Mr. Allan is now serving as a director of the association and in addition to his work with the A.F.A. has been an active and valuable member of committees of other technical and engineering associations.

Mr. Allan has been connected in various capacities with the International Harvester Co., Chicago, for 29 years. He was born in Chicago, attended the public schools and Lewis institute of that city. Entering the employ of the International Harvester Co., after receiving his engineering training at Lewis institute, he was first employed as a draftsman and later as efficiency engineer. Then, for several years he was assistant superintendent of the McCormick works in charge of the malleable foundry. Following that connection, Mr. Allan was transferred to the industrial engineering department of the Harvester company, and is now assistant manager of the industrial engineering and construction department.

Mr. Allan is at present chairman of the A.F.A. industrial hygiene codes committee, of the committee on foundry refractories. He represents the association on the A.S.T.M. committee on refractories and the American Standards association committee on safety code for exhaust systems. He is also a member of and (*Please turn to page* 90)

James R. Allan

Donald J. Campbell

Harold S. Falk

Castings For M

By PAT DWYER

THROUGH the courtesy of the Cincinnati Milling Machine Co., foundrymen from all over the country attending the American Foundrymen's association convention May 15-18, will have the opportunity of visiting a foundry where science, skill and experience extending over a period of many years are exemplified in the production of high grade gray iron castings for machine tools. Visits to Cincinnati plants No. 1 and No. 2 as well as the training school are also proposed. In addition to milling machines in a wide range of sizes, styles and capacities, the company manufactures machines for centerless grinding, lapping, broaching, automatic profiling and die sinking.

Even in America, traditional land of opportunity, the growth of the company and its manufacturing facilities have been remarkable, due in great measure to the personality, organizing and administrative ability of Frederick A. Geier, founder and active head of the company from 1889 to 1934. The Cincinnati Screw & Tap Co., opened a small shop in 1884 and among other activities built a small milling machine for its own use. Later several machines were built for other shops in the district. The young bookkeeper, Fred A. Geier, just 21 at the time, saw the sales possibilities of the machine. With several other employes he organized the Cincinnati Milling Machine Co., and in the early days was clerk, pay master, bookkeeper, office boy and salesman. During his long and active career he saw the number of employes grow from 10 to 2500. He saw the modest little shop moved to

Fig. 1 (Left)—Pyrotechnic display when the cupola is tapped. Fig. 2 (Left below) — Scene on the setting-up floor where molds are cored and assembled. Fig. 3 (Below)—Large dry cores are turned out on perfectly flat, heavy cast iron plates

r Machine Tools

large quarters and when that was crowded beyond capacity he saw the present magnificent plant covering 16½ acres erected on a site in Oakley, a suburb of Cincinnati.

Civic, social as well as industrial minded, he welded an organization where the best of relations prevailed between men and management. An employes service department was set up in 1914. Earliest activities included making of physical examinations at time of employment, giving medical, surgical and diagnostic service with the organization of an employes health and insurance association. Prevention of sickness and accidents was stressed through co-operation of management and employes. Group life insurance was set up. Within the last year a group hospitalization plan has been instituted, a forerunner of a proposed plan for city wide industrial hospitalization. A dentist was employed and a broadly conceived employment department instituted where all problems of workmen's compensation, personal and legal difficulties are handled.

While a great deal might be written on the many and widely diversified departments of the plant, where the majority of the men are engaged in machining, assembling, erecting and testing machine tools in almost endless variety, the present description is confined to the foundry with a daily melting capacity of approximately 45 tons of gray iron castings ranging in weight from a few ounces to 10,000 pounds. Larger castings, long grinder beds and others of a somewhat similar character usually molded in pits in the floor, are made in a second foundry in another section of the

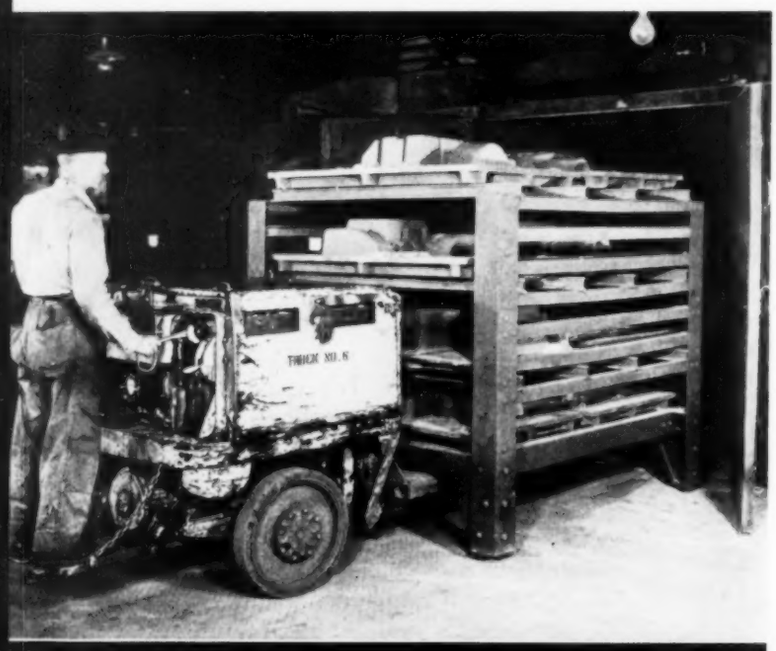
Cincinnati Plant Visitation May 14 to 18

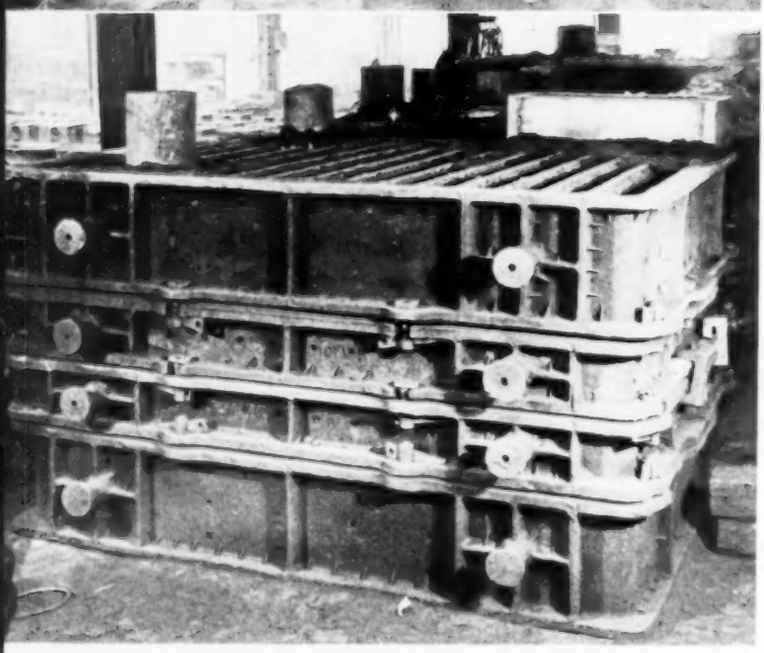
A COMMITTEE of the Cincinnati District chapter of the American Foundrymen's association has arranged an interesting program of plant visits for the week of the Cincinnati convention. An organized visit to the plant of the Cincinnati Milling Machine Co. has been arranged for Monday afternoon, May 14. Other organized visits include a trip to the Portsmouth plant of the Wheeling Steel Corp. on Sunday, May 14, and an inspection and party at the plant of the Hamilton Coke & Iron division, American Rolling Mill Co., Hamilton, O.

During the week the following plants will be open for visitation with information supplied at the booth of the plant visitation committee in the Hotel Gibson.

Buckeye Foundry Co.; Cincinnati Steel Castings Co.; Edna Brass Mfg. Co.; General Machinery Co.; Griffin Wheel Co.; Hamilton Foundry & Machine Co.; Lunkenheimer Co.; Magnus Metal Corp.; Oberhelman Ritter Co.; Ohio Pattern Works & Foundry Co.; Peerless Foundry Co.; N. Ransohoff, Inc.; Sawbrook Steel Castings Co.; Wheeling Steel Co.; D. T. Williams Valve Co.; Williamson Heater Co.

Fig. 4 (Below)—Metal temperature is taken while pouring of the mold is in progress and is supplementary to temperature reading through optical pyrometer at the time the metal is tapped from the cupola





city where adequate facilities and suitable equipment are available.

Operation of the foundry presents a somewhat peculiar problem in that the number of castings from any given pattern does not warrant the expense of special equipment. Gradually over a period of years methods and equipment have become standardized to a certain extent and yet have remained flexible enough to lend themselves to the production of a variety of castings which differ considerably in size, weight and design.

Castings have been divided into two general classes dependent on size and requirements. The first class includes castings ranging in weight from 275 to 10,000 pounds, milling machine columns, grinder beds and bases, knees, saddles, tables, feed boxes, over arms and other large parts. Molds for all these castings are dried in the oven. The second class includes all small parts from a fraction of a pound up to 275 pounds, brackets, retainers, bushings, etc., and are cast in green sand molds. Patterns are all mounted for machine molding, on matchplates for the squeezer machines and on suitable foundation boards for the large jolt ram machines. Hand ramming is practiced on only one floor, set apart for odds and ends, experimental jobs and other miscellaneous work of that general character.

Reduce Number of Flask Sizes

As a result of the standardization program the number of sizes of cast steel flasks in the dry sand section has been reduced to eight. By careful analysis of casting requirements the engineering department devised a system of flask part sizes which permit the maximum production of castings with minimum flask equipment. Before this standardized system was adopted the number of iron flask sizes in use was between 80 and 90. General and several special features of the steel flasks may be noted in the example shown in Fig. 7.

Each flask part is a heavy one piece steel casting, presumably able to hold its shape indefinitely without buckling or warping when exposed either steadily or intermittently to a temperature of approximately 800 degrees Fahr. in the drying oven. The joints are machined accurately so that cope and drag come into even and proper contact when the mold is closed, although in making the mold the cope and drag are rammed separately instead of with the cope on top of the drag as in ordinary practice. Pin holes are drilled through a standard jig, a feature which favors interchangeability of parts. Steel bolts instead of clamps are employed for fastening the parts together. The bolt has a head at one end and a slot through the other end. A tapered steel key is driven through the slot to tighten the bolt. To remove the key, the sharp point of a small steel bar is inserted in a hole provided for that purpose in the wide end of the key.

Fig. 5 (Top)—Cores are loaded on racks and carried on lift trucks into and out of the ovens. Fig. 6 (Center)—Typical casting immediately after shaking out. Fig. 7 (Bottom)—Flasks are substantial one-piece steel castings planed on the joints and held together with key bolts

A sharp tap of a hammer applied near the key end of the bar releases the key.

Equipment in the core room is designed on the same general principle to secure strength and rigidity. Oil sand cores are employed extensively and since the majority present bearing and contact points it is essential that they shall be made and jointed accurately. Heavy cast iron core plates are planed on the face and reinforced liberally on the back with ribs. Also they are pierced with numerous vent holes to facilitate drying the under surface of the cores.

Small cores are loaded on racks and conveyed into and out of the oil fired ovens by lift truck. Large cores are loaded on racks and lift trucks. Temperatures in the ovens are controlled automatically and operating charts are filed for long periods for comparison. Plain cores are rammed on machines, but intricate cores requiring special reinforcement grids, rods and hooks are rammed by hand as shown in Fig. 3. To conserve space on the core plate it will be noted that two separate cores are made in the same box. This illustration also shows the sturdy construction of the corebox and the stack of core plates at the left.

Core Sand Is Not Reclaimed

No attempt is made, at present to reclaim any of the core sand after the castings are shaken out. The core sand is removed from the castings and taken to the dump. Molding sand is in a different category and will be taken up later. Core sand mixtures contain varying proportions of sharp sand and bank sand, depending principally on the shape and general bulk of any given core and the degree of green bond strength required to prevent warping or sagging in the green state. All the mixtures are bonded with linseed oil and are prepared for use in a muller type mixer.

On all the large and on many of the small molds a dry sand cup core is inserted in the top of the sprue as shown in Fig. 13. The core is made in two parts, the cone *B* and the strainer *A*. In making the core, the strainer is pasted into a recess in the core and the assembled core is dried as a unit. The core may be rammed up with the cope, or it may be placed in a suitable recess provided for that purpose. With the core in position, the remainder of the green sand runner basin is made up in the usual manner by placing a suitable shaped block over the core and inside the runner box frame. Sand is rammed around the block to form a clean, solid bottom and side wall when the block is removed. While pouring the iron, the runner box is filled rapidly at the beginning and then kept full until the metal appears in the risers. In this manner any loose sand, scum, slag or other foreign material that possibly might develop in the runner basin is kept floating on top of the metal while clean iron flows through the strainer core and into the sprue and gates leading to the mold cavity.

Majority of the molds are dried for a double purpose. First to provide a solid, (*Please turn to page* 98)

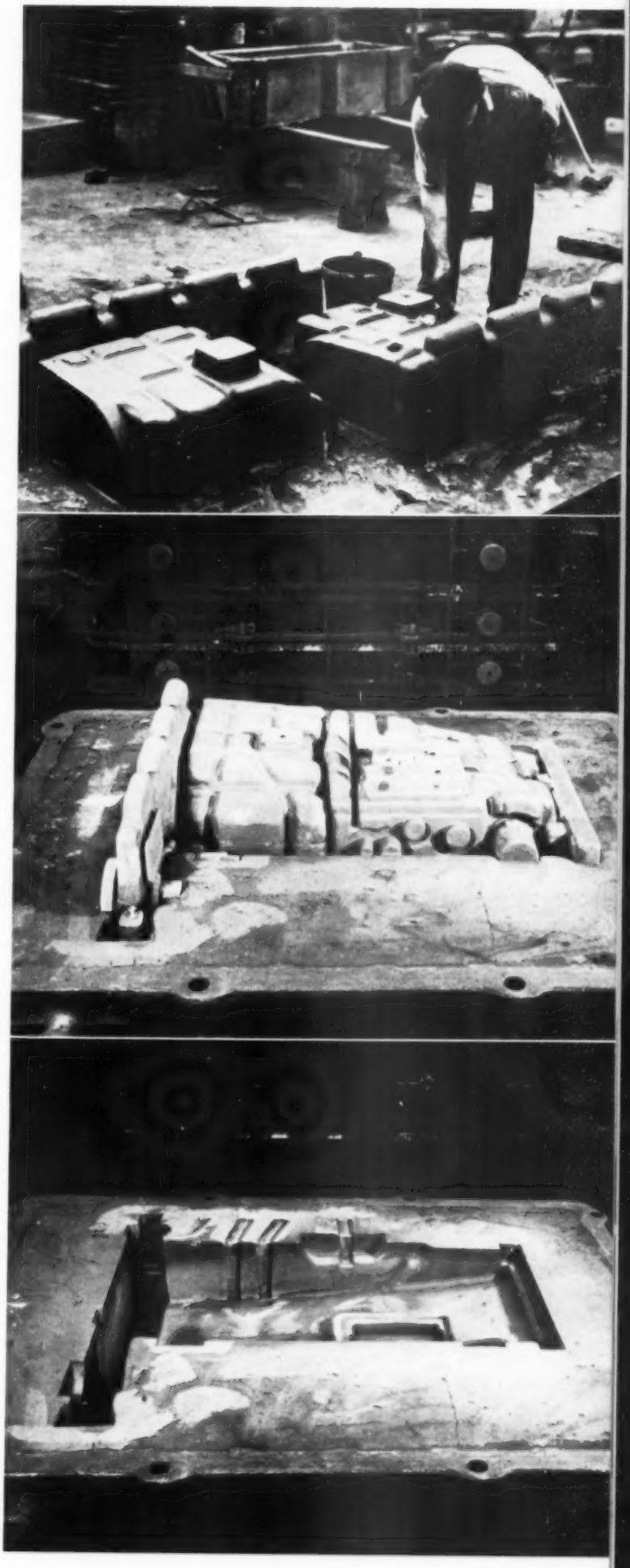


Fig. 8 (Top)—Green cores are sprayed with a coating of blacking before they are placed in the oven. Fig. 9 (Center)—Great care and accuracy are required in placing a set of cores in a large mold. Fig. 10 (Bottom)—Gates extending to the bottom are shown on the far side of the mold

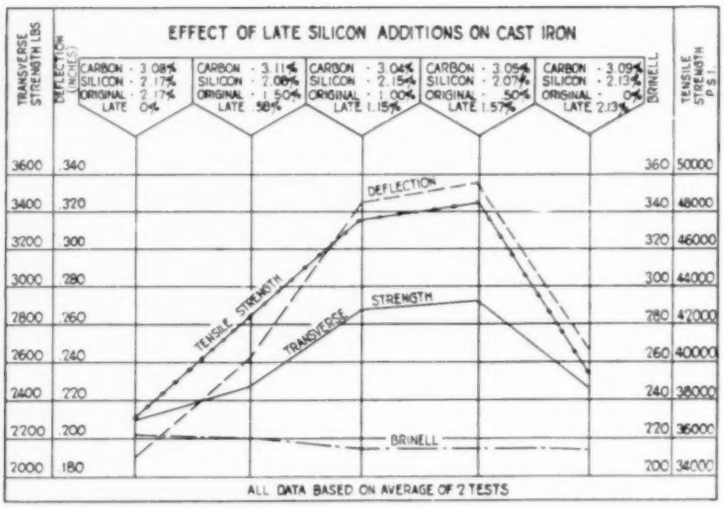

EFFECT OF LATE SILICON ADDITIONS ON CAST IRON
TRANSVERSE STRENGTH LBS
DEFLECTION (INCHES)
BRINELL
TENSILE STRENGTH P.S.I.
CARBON - 3.08% SILICON - 2.17% ORIGINAL - 2.17% LATE 0%
CARBON - 3.11% SILICON - 2.08% ORIGINAL - 1.50% LATE .58%
CARBON - 3.04% SILICON - 2.15% ORIGINAL - 1.00% LATE 1.15%
CARBON - 3.05% SILICON - 2.07% ORIGINAL - .50% LATE 1.57%
CARBON - 3.09% SILICON - 2.13% ORIGINAL - 0% LATE 2.13%
3600 340 360 50000
3400 320 340 48000
3200 300 320 46000
3000 280 300 44000
2800 260 280 42000
2600 240 260 40000
2400 220 240 38000
2200 200 220 36000
2000 180 200 34000
DEFLECTION
TENSILE STRENGTH
TRANSVERSE STRENGTH
BRINELL
ALL DATA BASED ON AVERAGE OF 2 TESTS

Fig. 1—Relationship between the carbon-silicon ratio and the tensile strength

Engineering

By V. H. SCHNEE and C. H. LORIG
Research Engineer and Metallurgist,
Battelle Memorial Institute, Columbus, O.

IT IS desirable occasionally to pause for a moment to survey the work that is being done by engineers and metallurgists throughout the world to extend our knowledge of cast iron. Published reports of that work taken for any short period of time, can do no more than serve as progress reports. However, they do indicate trends of thought and they show rather clearly where men's interests lie.

Selected information from the technical literature of 1938 has been compiled to permit a quick review of current progress and to serve as a guide for more extended study. References to these articles have been grouped to bring together the current literature on several topics of interest to the engineers as well as the producers of gray cast iron.

The Institution of Mechanical Engineers, in England, formed a research committee in 1936 "to make a systematic and co-ordinated exploration of the properties and performance of high duty cast irons, with special reference to their development and use for general engineering purposes." The first report of this committee is divided into three parts, Part I, The Development and Properties of High Duty Irons, prepared by Pearce[1], Part II, dealing with tests on commercial materials and Part III, with experimental work on plain cast iron.

Part I discusses the manufacture and properties of high duty cast irons in terms of the British Standard Specifications, No. 786, issued in 1938[2]. Three grades of cast iron are recognized in this specification, namely,

Grade I—High quality engineering irons made by ordinary processes, usually with the use of small quantities of steel scrap or refined iron. The tensile strength, as shown by the 1.2 inch diameter test bar is 32,000 pounds per square inch minimum.

Grade II—The highest grade of engineering iron made by ordinary processes such as high steel or refined iron mixtures or ordinary nickel or other alloy irons. Tensile strength, 1.2-inch test bar, is 38,000 pounds per square inch minimum.

Grade III—Irons made by special processes, such as inoculation, superheating, etc. Tensile strength, 1.2-inch test bar, 45,000 pounds per square inch minimum.

These grades correspond to the class 35 to class 50 grades of the A.S.T.M., although in the United States no restrictions are placed on composition or method of manufacture. The composition and physical properties of eleven different cupola irons that meet grade II of the British specification have been assembled as Table I.

The report includes a discussion of the physical properties and the

Table I

Cupola Cast Irons

Abridged Table of Composition and Properties as shown by Pearce, First Report on the Engineering Properties of High Duty Irons

No.	C %	Si %	Alloy %		Tensile strength lb. sq. in. 1.2" test bar	Brinell Hardness	Transverse rupture strength lb. sq. in. 1.2" test bar	Deflection inches 18" span
			Cu	Cr				
N35	3.18	2.06	0.21	0.21	38,800	241	63,200	0.13
N12	3.47	0.89	...	...	35,200	223	59,800	0.23
N76	3.06	1.32	...	...	36,800	242	64,000	0.25
N60	3.16	0.93	...	...	34,800	198	86,000	0.35
N63*	2.89	1.49	...	...	38,400	229	73,600	0.30
N44*	2.65	2.39	...	...	35,800	259	68,600	0.13
			Cu	Cr				
N41*	2.72	2.26	2.12	0.14 Ni	40,800	290	63,600	0.11
N10	3.20	1.26	0.36	1.52	36,200	2348	69,400	0.17
			Cu	Mo				
N54†	3.02	2.26	0.28	trace	35,800	197	64,800	0.32
			Ni	Cr				
N55	3.21	1.26	1.31	0.52	36,600	290	59,000	0.16
			Ni					
N84	3.39	1.62	1.46	...	.....	240	62,800	0.16

* Emmel type.
† Inoculated type.

Properties of Gray Iron Improve

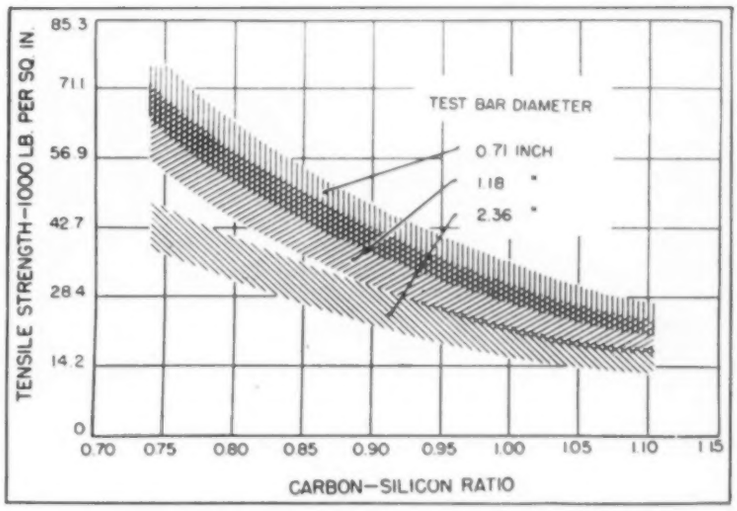


Fig. 2—Effect of carbon plus silicon on tensile strength

microstructure of these irons and a description of the properties of certain electric furnace and highly alloyed irons. Part III discusses an investigation of the effects of phosphorus on the high duty cast irons. It was found that in the medium quality irons, grade II, the presence of phosphorus up to 0.5 per cent is permissible, provided that the total carbon is sufficiently low, say below 3.2 per cent, to keep the phosphide in a network formation. In the high quality irons, grade III, phosphorus up to 0.5 per cent does not influence the tensile strength greatly but reduces transverse strength, deflection and resistance to impact. It is well worth reading for general information.

Data to illustrate the relation between the structure and properties of gray cast iron have been published by Hanemann and Schrader in Germany[3]. Those data illustrate the effect of section size on the properties of gray cast iron as the tensile strengths and brinell hardness of four different sizes of a cast test bars were determined. Part of the data are assembled as Table II.

The relation between tensile strengths and the carbon-silicon ratio for 3 different size test bars is shown graphically in Fig. 1. The relation between carbon and silicon is that derived by Jass. It is found by the formula

$$R = \frac{\%C}{4.23 - \frac{\%Si}{3.2}}$$

Other formulas expressing the carbon-silicon ratio would of course result in the same type chart.

Additional data to illustrate the relation between carbon and silicon content and the properties of cast iron are given in a comprehensive paper by Bardenheuer and Brohl[4]. These data also show the effects of heat treatment on the different cast irons. Tensile and transverse strengths are plotted against the combined carbon and silicon contents in Figs. 2 and 3 taken from that paper. Data showing the effect of heat treatment on the brinell hardness and the impact strengths as well as the effects of manganese on the structure and properties of the irons are included in the original paper.

Knehans[5] gives the values shown in Table III for high test cast irons produced in Germany by Krupp, and Dudouet[6] describes the methods used to produce high test cast irons in France. The relation between strength and brinell hardness of various plain cast irons was discussed in detail by Boegehold[7] before the American Foundrymen's association.

At the same meeting and as part of the same discussion, Crosby[8] described the microstructure and physical properties of alloy cast irons. Alloying elements are classified in this paper as follows:

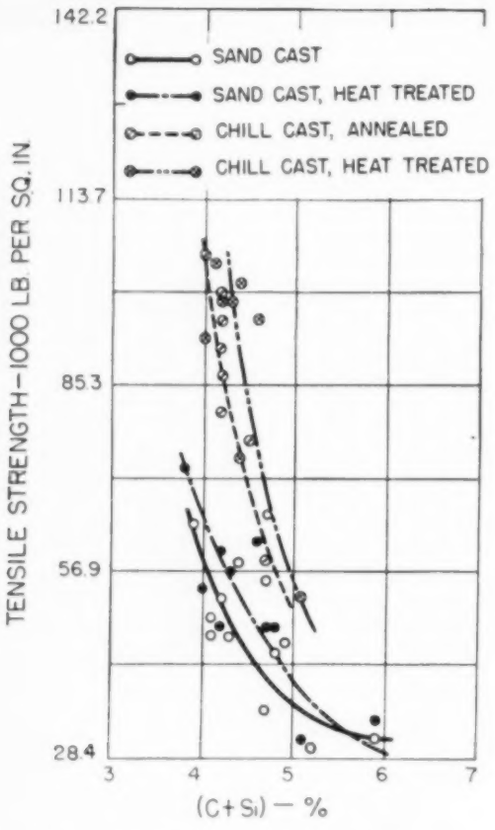
1) Elements which increased combined carbon and

Table II

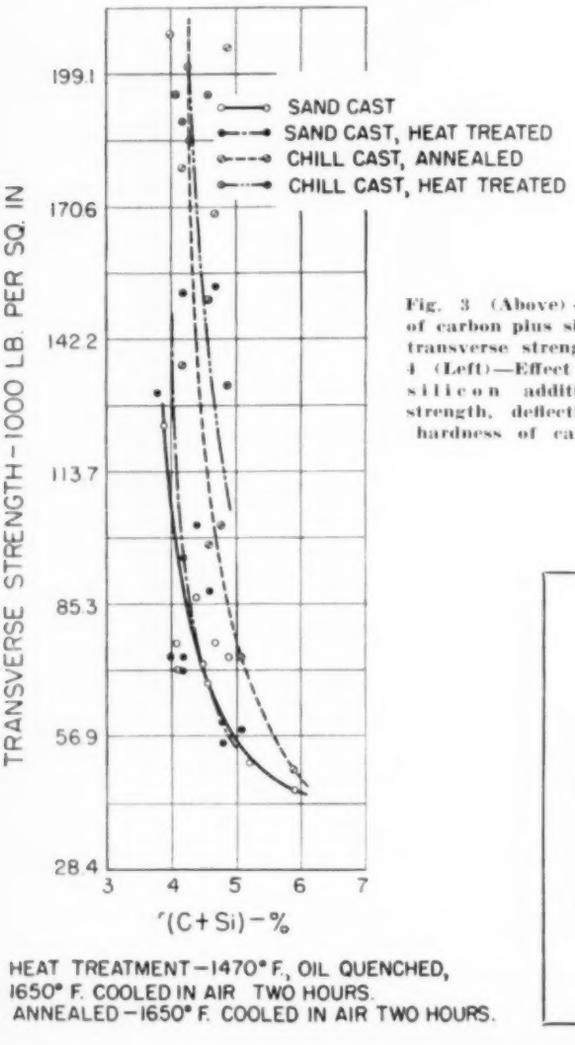
Cupola Cast Irons

Abridged Table of Composition and Properties
As Shown by Hanemann and Schrader

No.	Composition C per Cent	Composition Si per Cent	Tensile Strength 1000 lb. sq. in. Diameter test bar mm. 60	33	18	10	Brinell Hardness Diameter test bar mm. 60	33	18	10
			Diameter test bar in. 2.36	1.18	0.71	0.39	2.36	1.18	0.71	0.39
A...	3.79	2.25	17.75	18.5	27.2	36.5	122	137	167	187
D...	3.49	2.46	...	20.6	....	37.8	153	180	204	224
E...	3.87	1.93	19.3	23.3	31.0	...	137	156	194	224
G...	3.36	2.41	19.3	25.5	33.4	41.6	139	175	214	231
H...	3.14	2.82	24.0	30.7	38.2	48.5	170	184	213	239
I...	3.44	1.37	28.1	31.8	44.3	40.8	211	215	231	272
K...	3.34	1.55	28.1	35.2	43.3	51.8	216	197	231	260
L...	3.28	2.32	26.7	35.0	41.8	56.2	194	200	226	260
M...	3.34	2.07	28.1	35.2	42.6	52.5	187	202	236	302
N...	3.24	1.43	32.8	37.8	48.4	36.3	196	218	254	256
O...	3.02	2.25	28.3	40.8	51.8	46.5	197	207	229	236
P...	3.23	1.48	34.9	41.1	48.6	44.6	208	222	241	257
Q...	3.26	1.17	35.4	41.5	53.5	55.3	204	211	231	282
R...	3.20	2.05	31.3	41.8	48.7	53.5	196	217	240	253



HEAT TREATMENT—1470° F., OIL QUENCHED,
1650° F. COOLED IN AIR TWO HOURS.
ANNEALED—1650° F. COOLED IN AIR TWO HOURS.



HEAT TREATMENT—1470° F., OIL QUENCHED,
1650° F. COOLED IN AIR TWO HOURS.
ANNEALED—1650° F. COOLED IN AIR TWO HOURS.

Fig. 3 (Above) — Effect of carbon plus silicon on transverse strength. Fig. 4 (Left)—Effect of late silicon additions on strength, deflection and hardness of cast iron

free cementite, listed in order of intensity: a) Vanadium, b) chromium, c) molybdenum, and d) manganese.

2) Elements which tend to reduce the amount of common hardening constituents, cementite and pearlite, in order of intensity: a) Graphitic carbon*, b) silicon*, c) titanium, d) nickel, and e) copper. (*Ordinarily not considered as alloying elements).

Charts and tabulated data showing the effects of these different alloying elements on the tensile strength and brinell hardness of a wide variety of cast irons are given in that paper.

Those data are supplemented by the results of tests on 2-inch sections, the A.S.T.M. type C test bar, on a number of different plain and alloy cast irons, reported by Young, Crosby and Herzig[9]. Details of composition and melting practice are tabulated in the original article which should be consulted. From this series of tests the authors conclude that unheat treated 70,000 pounds per square inch tensile strength cast iron is available commercially and irons containing approximately 2.50 per cent carbon and 2.50 per cent silicon, when properly alloyed to obtain a balanced structure and processed for normal graphite, produce maximum physical properties in 2-inch section.

The effect of ladle additions of various elements and alloys is receiving increasing attention. Crosby[10] gives the data shown in Fig. 4 to illustrate the effect of late additions of silicon on the strength, deflection and hardness of cast iron.

The comparative effects of late additions of titanium and silicon to gray cast iron have been investigated by Comstock[11]. The claim is made that greater improvements in properties are obtained by treatment with ferrotitanium than with ferrosilicon. McElwee[12] suggests that the foundryman can study this effect on commercial irons by making use of a wedge casting so that the degree of chill can be observed readily. This gives a convenient measure of the graphitizing conditions in relation to a commercial run of castings.

Indications of the effect of additions of various elements on the properties of cast iron are shown by the work of Crosby, cited previously. Additional references dealing with the more specific effects claimed for the different alloying (*Please turn to page* 86)

Table III

High Test Cast Irons

Nominal Composition and Average Properties (Knehans)

Trade Name	SO26	SO30	SO40
Carbon per cent	3.0-3.3	2.9-3.1	2.7-2.9
Silicon per cent	1.3-1.5	1.5-1.8	1.8-2.0
Manganese per cent	0.8-1.0	0.8-1.0	0.8-1.0
Sulphur per cent	0.10 max.	0.10 max.	0.10 max.
Tensile strength, 30 mm. (1.18") test bar, lb. sq. in.	42,000	48,000	62,000
Transverse strength, lb. sq. in. 1.18" test bar, 23.6" span	71,500	84,500	90,000
Deflection, inches	0.39	0.39	0.47
Brinell hardness	200	220	220
Compressive strength, lb. sq. in.*	136,000	136,000	155,000
Torsional strength, lb. sq. in.†	48,000	63,500	63,500

* Test bar: 25 mm. (0.985-inch) diameter
35 mm. (1.379-inch) high
† Test bar: 30 mm. (1.18-inch) diameter

AMONG DETROIT FOUNDRIES

By A. H. ALLEN
Detroit Editor, The Foundry

WHILE it might be thought the casting of parts for automobiles in the upper-price brackets would involve a more leisurely and perhaps more painstaking technique, this is not altogether the case. The extensive Cadillac foundry in Detroit, for example, well equipped and staffed to turn out all castings required in Cadillac and La Salle cars, must compare favorably with other foundries operated by General Motors on a cost and efficiency basis. That it has been able to do this successfully is a tribute to an efficient organization and to the stewardship of H. B. Swan, foundry superintendent now rounding out a quarter century of service with Cadillac.

Foundry Contemplates Improvement Program

Just now Cadillac is drawing 1939 production to a close. This summer a rather complete program of modernization and re-equipment will be undertaken in the foundry division in preparation for 1940 models.

At one time the company operated brass and aluminum foundries in addition to the iron casting division, but the former have both been abandoned. However, the building space is available, and in case of emergency could be readied quickly for casting nonferrous metals.

Cadillac castings are divided into two general classes, hard iron and soft iron, with about 70 per cent of production in the first classification including cylinder blocks, cylinder heads, differential housings, flywheels, and the like. Soft iron castings include clutch housings, transmission cases, pump bodies and the usual run of smaller parts.

Three cupolas are available, 60-inch, 54-inch and 42-inch. The 54-inch unit is operated on hard iron, with the 60-inch unit held in reserve. The 43-inch unit supplies the soft iron. Mixture for the hard iron approximates 40 per cent scrap (return scrap plus borings and turnings), 35 per cent steel and 25 per cent pig iron. The iron ranges from 3.25-3.35 per cent carbon and from 2.15 to 2.30 silicon. Soft iron mix averages 40 per cent pig, 8-10 per cent steel and the remainder scrap. Analysis shows from 3.40 to 3.50 per cent carbon and about 2.50 per cent silicon. Approximately 300 tons of borings and turnings per month are required normally for melting operations.

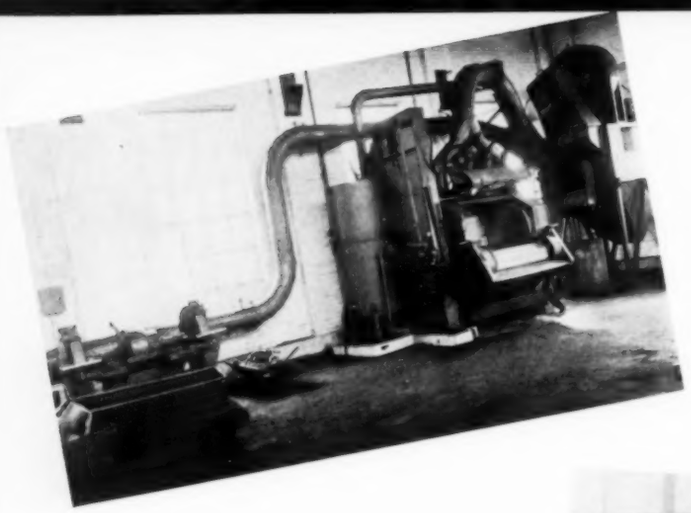
Iron is tapped at a temperature of 2800 degrees into holding ladles accommodating 1600 pounds. From the latter it is transferred either to ladle cars running on overhead monorails and carrying 1500-pound ladles, or to smaller barrel-type ladles holding 600 pounds, also operating over the monorail system. The larger ladles are used to pour the heavier castings, such as cylinder blocks, while molds for smaller parts are filled from the smaller ladles. Temperature drop between tapping and pouring is figured at around 100 degrees, with pouring temperature 2600 degrees for an absolute minimum.

Present facilities are based on requirements for 280 cars daily. With the improvements to be made this summer, daily output will be boosted somewhat, estimates indicating maximum daily output around 200 tons.

Cylinder Block Is Intricate Casting

The V-8 cylinder block, used in Cadillac and La Salle engines has a weight, before machining, of 320 pounds, requiring about 475 pounds of metal in the mold. V-16 blocks are run through from time to time, usually in lots of 30 to 50. The latter, weighing 420 pounds, is a fine example of an intricate large size automotive casting, and requires special attention in molding and pouring.

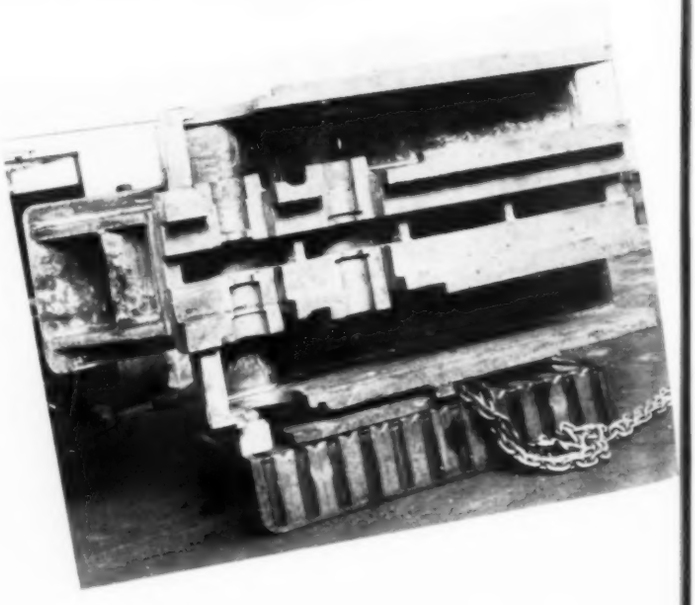
Cylinder block molds travel on a floor conveyor system from molding machines to coresetting stations. Drags are skin dried with the usual type of swinging gas burners before the cores are placed in position. The blocks, one casting to a mold, are poured with the bottom of the casting in the top position. After shaking out, the castings, still a bright red, are transferred to an (*Please turn to page* 89)



Apply Modern

A CASTING cleaning plant, which is sanitary, highly efficient and well equipped recently has been completed and put into operation by the Waterbury Farrel Foundry & Machine Co., Waterbury, Conn. This cleaning plant, one of the most up-to-date of its kind, is the culmination of extensive research relative to dust control and general sanitation. All-around efficiency and output facilities beyond anticipation have been realized.

Installation of wet dust arresters, scientifically applied to modern cleaning equipment practically has eliminated the health hazard of dry dust. The arresters collect more than 98 per cent of the entrained dust. A saving in time of more than 75 per cent has been realized by replacing core diggers and other hand implements with improved equipment. For example, a large core which formerly required two men 2 days to dig out, now can be removed from the casting in 2 hours by one operator working in comparative comfort.



Built Especially for the Purpose

This modernly equipped cleaning department is housed in a new fireproof steel and brick building 84 x 130 feet, erected especially for the purpose and illustrated in Fig. 10. The floor is end-grain wood block. The building is situated adjacent to the foundry, from which the castings are delivered by storage battery truck, through the doorway shown at the right. The doorway at the opposite end of the building, adjacent to the office entrance, leads to the shipping floor and is the motor truck entrance. An interior view looking south from the shipping floor is shown in Fig. 5. This view shows the previously mentioned doorway at the south end and the foundry beyond.

The new and spacious cleaning room is equipped for handling easily and without confusion the peak load of the foundry approximately 50 tons of iron castings per day. Working conditions are as nearly ideal as possible. The building is heated scientifically by an overhead unit heater system, three encased steam heating elements of light weight, suspended high in the center bay, as shown in Fig. 5. A motor driven propeller fan, mounted above each unit, draws air from above the heater and discharges it downward through a copper tube heater and suitable outlets, to the working level.

Uniform distribution of heat results in comfortable working conditions. The system eliminates cold drafts, removes all interference from coils and radiators along the walls, conserves working space and does away with the nuisance of regulating numerous radiator valves manually to suit varying climatic conditions. In warm weather the fans may be operated to circulate air collecting near the roof, which otherwise would become hot, stagnant and oppressive with resultant depressing effect on workmen.

Cleaning Methods

By FRED DANIELS
Waterbury Farrel Foundry & Machine Co.,
Waterbury, Conn.

Excellent lighting is provided, through continuous steel sash wire glass windows, high in the center bay; also by an electrical lighting system including six 400 watt high intensity mercury lamps in the center bay, and rows of 150 watt incandescent lamps, with reflectors, along the side walls.

Equipment for cleaning the smaller castings, includes one tumblast machine, three double spindle grinding machines and four exhaust hoods extending over the bench on which the chipping and grinding are performed with portable tools. This equipment is located along the wall in the east bay, shown at left in Fig. 5 and partly shown in Fig. 1. The two large units shown in Fig. 3 are the blasting and a 16-horsepower dust arrester connected to serve both the blasting machine and the grinders. The castings are delivered in steel boxes and placed on platforms in the space provided near the blasting machine.

Equipment for cleaning large castings located at the right as shown in Fig. 5 includes an hydraulic washing room and a blast room, both of which are shown in Fig. 2, with doors open and work in place. The blast room is served by a 20-horsepower dust arrester similar to that shown in Fig. 1, located in the rear.

Space in the foreground, Fig. 5, is used for hand chipping the large castings by portable pneumatic tools. A portion of the right bay is reserved for welding equipment, electric and acetylene. The large central bay is served by a 15-ton traveling crane, the east bay by a 5-ton crane and the space in back of the hydraulic washer by a 2-ton monorail grab bucket, shown in Fig. 6.

The smaller castings placed in the barrel of the blasting machine are blasted with steel shot while being tumbled. They are then removed and snagged, either at the bench or on the grinding machines. Dust laden air is exhausted from the barrel by a mo-

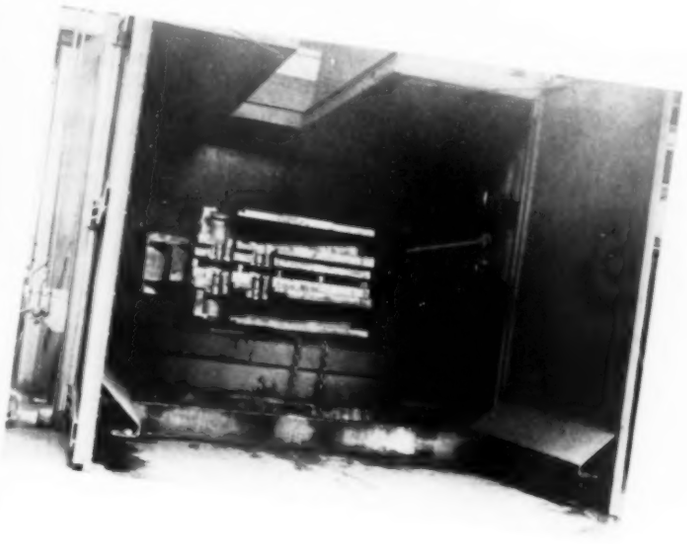


Fig. 1 (Upper left)—Abrasive blasting unit, wet dust arrester and one of the grinders for small castings. Fig. 2 (Center left)—Hydraulic wash room and blast room with doors open and work in place. Fig. 3 (Bottom left)—Casting shown in Fig. 7 after cleaning. Fig. 4 (Above)—Casting on turntable in wash room after cores have been removed by high pressure water. Note nozzle and 4 screened flood lights at right. Fig. 5 (Right)—General interior view looking south. Overhead unit, heating, excellent light and almost complete control of dust combine to produce practically perfect working conditions

tor driven impeller in the wet type dust arrester, while the steel shot automatically is returned to the supply tank. The dust is sprayed with a stream of water as it is drawn in by the impeller. It gathers as sludge on the impeller blades and finally accumulates in the hopper underneath. The cleaned air is expelled out of doors, through a flue.

This dust arrester is of substantially the same construction as the 20-horsepower unit which serves the blast room, except that it is equipped with a chain type sludge ejector. In the larger machine the sludge runs out of the hopper and into a settling tank. Further attention will be paid that feature in connection with detailed reference to Fig. 6, which shows a side view of the larger arrester, and the space in back of the blast room and hydraulic washer.

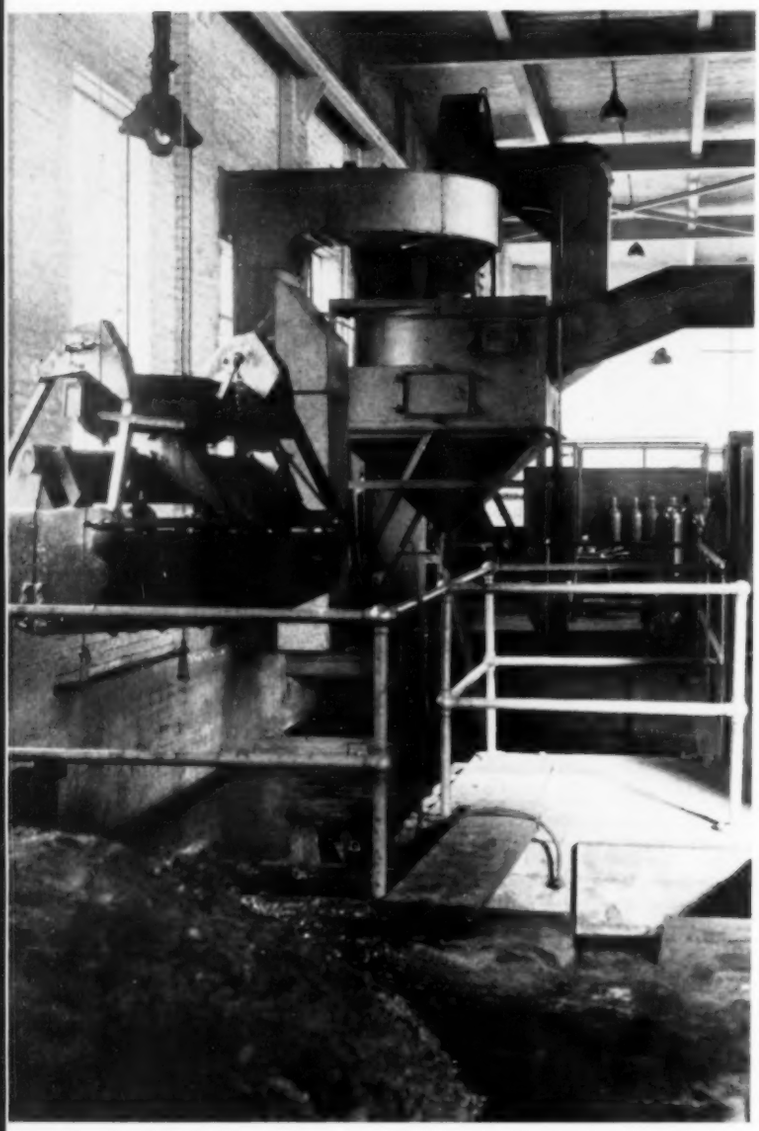


Fig. 6—Three cement sumps in which the drain water settles and is filtered for recirculation. Grab bucket and dust arrester which serves the blast room also are shown

Large castings are cleaned by first removing the cores with a stream of high pressure water, then blasting with steel grit, and finally removing fins and other surface defects by portable hand tools. Fig. 7 shows a large casting near the hydraulic washer as it arrives heavy with cores from the foundry. Fig. 3 shows the same casting, weight 11,875 pounds, as it looks after cleaning. The casting is picked up by the crane and lowered onto the turntable in the hydraulic room as shown in Fig. 4. This table of course, may be loaded to capacity with two or more castings located so as to best expose the cored sections to the force of the water stream.

The table, 12 feet in diameter with a steel top, is mounted on roller bearings and is driven by a 15-horsepower motor, but does not revolve during the washing operation, except to change the angular position of the work relative to the water stream as the removal of the cores progresses. This is done by a jog button and brake at the operator's station.

The room of ¼-inch riveted boiler plate, 18 feet square by 13½ feet high, has a substantial cement foundation with inclined floor to shed the sand laden water, and a large drainage outlet. The full height front doors, and the narrow roof door to accommodate handling the work with a crane, are operated pneumatically and when closed, as shown in Fig. 8, seal the room water tight.

Delivers Water at High Pressure

A centrifugal hydraulic pump, having a capacity of 150 gallons per minute, is driven by a 75-horsepower motor and delivers the water at 400 pounds per square inch pressure, through a 1½-inch nozzle, shown at the right, Fig. 4. The operator's curtained platform is located between the wash room and the blast room, as shown in Fig. 2. A view which shows the platform to better advantage, the stairway leading up to it and the air valves for operating the wash room doors, is presented in Fig. 8. From this platform, the water valve and electrical controls are within convenient reach of the operator. With four screened 400 watt lamps and reflectors which flood light the interior of the closed room, and a guarded observation window, the operator can manipulate the nozzle handle from his station on the platform to direct the stream of water as desired and observe the progress made in removing the cores.

From the washer the casting is transferred to a flat car and rolled into the blast room shown in Fig. 9. This room also has a narrow roof door, for convenience in turning or lifting heavy castings with the crane. The room is 9 feet high by 10 feet wide. The main room is 12½ feet deep with a 4-foot extension separated by a folding door at the rear and utilized only when blasting long castings. The flat car has a capacity of 7 tons and runs on a 3-foot gage track which extends out of the room and across the center bay of the building.

Steel grit and heavy dust drop through the blast room floor into a hopper beneath. This mixture automatically is carried to the right by a motor driven screw conveyor, and thence up in a bucket elevator outside the room. As it passes upward, it is subjected to a current of air which separates the sand from the grit. The sand passes out as waste and the grit returns to the supply tank, to which the blast hose is connected. (*Please turn to page* 92)

Many Nonferrous Alloys Available

By N. K. B. PATCH

BRONZES 1*AA* to 1*II* in Table V comprise a series of compositions that might be termed high-lead bronzes, or high-lead tin bronzes. However, bronze implies appreciable quantities of tin, and therefore, the term high lead bronzes is sufficient. This group is a series of copper tin compositions in which the tin is in all cases 5 per cent or more; whereas the series which will be discussed later, although it is a high lead bronze, does not in most cases contain quite as much tin on an average.

Composition 1*AA* definitely permits up to ½ to 1 per cent nickel and a maximum of 0.01 per cent phosphorus. The nickel is not essential although it is used commonly in this alloy by some manufacturers. Presence of phosphorus is quite definitely essential since in the manufacture of the alloy the copper must be deoxidized and phosphorus is the most satisfactory material for this purpose.

Difficult To Control Zinc Content

Presence of 1 per cent zinc would indicate that this composition is a zinc deoxidized bronze, but with only 1 per cent zinc present, it is difficult to control this zinc accurately enough to be sure that the composition has been properly deoxidized and still have the full 1 per cent zinc in the final alloy. The fact that this composition permits 1 per cent zinc, some nickel, some phosphorus and contains appreciable quantities of lead and tin, indicates that it can be made from selected scrap and yet be within the chemical limits of the specification.

Composition 1*AA* is specified by the A.S.T.M. under B30-36 (15) and by the S.A.E. as composition 66. It is used commonly for small bearings and small automobile bearings in particular. It is not desirable to have iron in excess of 0.15 per cent if best results are to be obtained, since the presence of iron increases the tendency to shrinkage and requires additional risers to compensate for this increase. The A.S.T.M. specifies that antimony shall not be in excess of 0.25 per cent, and it generally is conceded that sulphur is objectionable.

What the precise limit for sulphur may be is debated since some metallurgists claim that a small percentage of sulphur in such alloys tends to aid in the suspension of the lead and insure the even distribution of the lead throughout the casting. Silicon and aluminum are objectionable. Neither should be present if best results are to be obtained. The usual limit of 0.01 per cent for silicon and 0.005 per cent for aluminum should be observed as maximum in this type of alloy.

Composition 1*BB* is essentially composition 1*AA*, hardened by an increase in the amount of tin and an increase in the amount of zinc. Tin has been increased from 5 to 7 per cent and zinc from 1 to 3 per cent. This raises ultimate tensile strength and yield point some, and tends to raise the elongation as indicated by the physical properties in Table VI which will appear later. This composition has much the same use as 1*AA* excepting that it is somewhat harder.

It does not machine quite as readily and where mass production depends upon the most rapid machining, some manufacturers prefer the former composition because of increased production capacity. The remarks dealing with 1*AA* in reference to impurities apply equally to this composition. It will be noted that neither phosphorus or nickel is mentioned as ingredients in this composition. However, the use of some phosphorus in the deoxidation of the copper before the white metals are added, is used almost universally by manufacturers of this alloy.

Zinc Used Instead of Phosphorus

Therefore, the best analysis of the resulting composition may indicate a trace of phosphorus in spite of the fact that it is not mentioned. Since this composition contains 3 per cent zinc, it generally is accepted as zinc deoxidized bronze and some of the zinc is frequently added to the copper first to deoxidize it preparatory to adding the white metals. In that case the use of phosphorus is omitted and additional zinc is added to compensate for that consumed in this deoxidizing process, so that the resulting composition will be up to formula.

Composition 1*CC* it will be noted is very similar to 1*BB* in its chemical specification. The noticeable change being an increase in the lead from 9 to 13 per cent accompanied by (*Please turn to page* 94)

QUESTIONS AND ANSWERS

Chilling the Teeth on Small Sprocket Not Economical

Before deciding on new pattern equipment we shall appreciate your opinion on the advisability of using chills to form the teeth on cast iron sprocket wheels ⅝ and ¾-inch pitch. The castings vary in diameter between 4 and 14 inches. They are used with roller chains and have maximum speed of 150 revolutions per minute. The present practice is to mold these castings from wood or milled metal patterns.

In many instances the teeth on large sprocket wheels are cast in chills, but we do not think the method economical on wheels with ⅝ or ¾-inch pitch. Of course an exact comparison cannot be made between small and large wheels in this particular instance. In large wheels the primary purpose of the chill is to impart a hard wearing surface on the sides or working faces of the teeth. As we understand your inquiry, you are more interested in securing a more perfect contour on the teeth and in eliminating grinding the fillets at the roots. The problem presents many interesting angles, including contraction, metal composition and the volume of production. Basing an opinion merely on the data submitted, we are inclined to the opinion, that in this particular instance adoption of chills for forming the teeth of the wheels is not a practical solution of the problem.

Melting Scrap Iron Repeatedly Makes the Castings Hard

We are running a small stove repair shop and are having trouble with hard castings. The cupola charge consists of stove plate and farm machinery scrap. We shall appreciate your advice on the cause and the remedy for hard castings.

The cause of your hard castings is the low silicon content of the iron. The remedy is to increase the content of this element. This can be done either by the addition to the cupola charge of a certain amount of pig iron high in silicon, or by the addition of ferrosilicon either in the free state or in the form of small briquets. Each time iron is remelted it loses from 20 to 25 points in silicon. The scrap you are using will show an average silicon content of approximately 2.50 per cent, perfectly satisfactory for the castings in which it first appeared. When you remelt it, the iron contains only 2.25 per cent silicon.

This iron would be satisfactory for thick castings, but when you pour it into castings 1/10 or 1/8-inch thick, it becomes chilled, or to put it another way a greater proportion of the carbon remains in the combined form. The result is a hard casting. Also since you have to remelt the gates, sprues and scrap, addition of that form of scrap to the charge lowers the silicon content still farther. Briefly you will have to prepare a charge showing a silicon content of approximately 2.75 per cent, to secure a satisfactory iron for your castings.

Wants To Use Reclaimed Sand In Facing Mold for Steel

Will you please answer the following questions: 1—Is any steel foundry in the United States using sea coal in facing sand. 2—Do you consider reclaimed sand suitable for use as facing when it has been screened through openings as coarse as ⅜-inch. 3—Do you consider it necessary to remove the fused sand particles rich in iron oxide before using reclaimed sand for facing in steel molding?

While it is entirely possible that sea coal has been added to steel foundry facing sand, we never in a rather wide experience have seen, heard or read of such an instance. The main reason of course, is that steel would absorb carbon.

If all the reclaimed sand that passed through a ⅜-inch screen was ⅜-inch in cross section it would be too coarse for facing sand. However, in ordinary practice the great bulk of the sand will be of ordinary grain size, and therefore the comparatively small amount of ⅜-inch material will not affect its utility. This refers particularly to large dry sand molds that are faced with a silica wash. Presence of lumps in facing for small green sand molds is not desirable since they tend to create an uneven surface on the casting.

Theoretically it may be desirable to remove all fused sand from the facing sand mixture, but in ordinary practice the presence of a small amount

of this material is not objectionable. In the reclaiming process practically all this material is rejected on the screens. Necessity of adding a certain amount of new sand to the facing mixture makes it mandatory to dispose of a corresponding amount of old sand daily, otherwise the sand heaps would grow to a size where—in the hyperbole of the shop—a man would need to climb a step ladder to reach his floor.

Refractory Sand Is Required For Glass Mold Casting

We are forwarding a half glass mold casting and will appreciate your advice on the proper grade of sand for molding this and similar castings.

Naturally bonded molding sands from different localities vary to a considerable extent in several particulars and yet produce the same results so far as moldability and surface appearance of the casting are concerned. In the present instance, for a chunky casting weighing approximately 50 pounds, sand of the following chemical and physical properties will serve satisfactorily: Silica 75 to 85 per cent, alumina 8 to 10 per cent, iron oxide 3 to 8 per cent, lime 1 to 2 per cent, magnesia 0.5 to 1 per cent; alkalies 1 to 3 per cent, loss on ignition 2 to 6 per cent. Grain fineness 80, clay 10 to 15 per cent, dye adsorption 800, permeability 100, green bond tensile 7 ounces, green bond compression 7 pounds.

For castings similar to that submitted the principal factors required in the sand are refractoriness and permeability. Refractoriness to withstand the heat from a large body of iron for a considerable period, and permeability to permit ready exit for the gas and stream generated under the same conditions. Briefly a sand of this kind may be described as a coarse open grade sand, with minimum clay content, about 5 per cent moisture and carrying seacoal in the proportion of 1 to 7 in the facing. In addition to secure a clean, smooth skin the surface of the mold should be brushed with plumbago.

Heat Treatment of an Aluminum Bronze Requires Experience

Can you give us information on heat treatment of an aluminum bronze containing 89 per cent copper, 10 per cent aluminum and 1 per cent iron? We are making some 30-inch rings of that material which, after having worm gear teeth machined in, must withstand shock rather than wear. It seems that the rings are benefitted by heat treatment and we would like to know the procedure.

Correct heat treatment of aluminum bronze to gain specific properties is a field that has to be investigated by experiment on your own product. Incidentally, those few firms that have conducted such investigations are rather reticent about giving information on the methods employed.

Since little definite information is available, we can only suggest the ranges of temperature to be employed, and you will have to experiment to find those that are most suitable for your product, and the specific application.

Aluminum bronze is completely solid at 1904 degrees Fahr., and will be composed entirely of the beta phase until a temperature of 1604 degrees Fahr. is reached, below which the alpha phase separates from the beta in increasing amounts until the temperature falls to 1060 degrees Fahr. At temperatures below 1060 degrees Fahr., the beta phase decomposes into the eutectoid consisting of alpha and delta phases.

Heat treatment of aluminum bronzes consists essentially of quenching in water or other medium the alloy from any temperature between 1900 degrees Fahr. and 1060 degrees Fahr. in which the alloy is within the beta or alpha-beta phase range. The beta phase is very strong and hard, and usually lacks ductility at room temperature whereas on precipitation of the alpha phase, the hardness and strength is decreased and the ductility increased. The alloys may be heat treated further by tempering at some temperature lower than the quenching temperature, but not below 1060 degrees Fahr., as brittleness is induced.

Use of Ladle for Melting Unit Is Not Practical

Occasionally we should like to melt from 100 to 200 pounds of iron. Several years ago we read in THE FOUNDRY a description of a method for melting iron directly in the ladle. We shall be pleased to have further details on this phase of melting iron, or on the general subject of melting small quantities to meet emergency requirements.

The article to which you refer was written several years ago by Robert E. Masters. It was used to illustrate some of the many ingenious and makeshift tricks to which foundrymen of the early days had to resort in cases of emergency. The ladle was filled with coke and the required amount of iron. Blast was introduced through a pipe which extended almost to the bottom. In *American Foundry Practice*, the late Thomas D. West refers to a makeshift rig, a flour barrel lined with brick, in which iron was melted on a float in a parade. Air was furnished by a blacksmith bellows.

Comparatively recent issues of THE FOUNDRY contain several descriptions of small home made cupolas set up to take care of small heats and emergency jobs on days when the regular cupola was not in operation. If you have a file of back numbers we refer you specifically to the issues of April and August, 1933, pages 48 and 22 respectively. The first was constructed of a number of cast iron rings. The second was a pair of oil drums with the bottoms knocked out, lined with brick and with one set on top of the other. Offhand we are inclined to the opinion that you would have more satisfactory service from a small cupola, than from the makeshift ladle melting piece of equipment.

Melting Loss Shows Wide Discrepancy

What is regarded as a reasonable melting loss in a gray iron foundry? During the year we purchased 438 tons pig iron and 590 tons scrap. We sold 765 tons castings. The pig iron was No. 1 and the scrap was motor blocks, water boilers, radiators, agricultural and general machinery containing about the average amount of waste when collected by small junk dealers. Our inventory increased during this period about 20 tons of pig iron and 8 tons of scrap.

According to the figures submitted your purchased 450 tons of pig iron and 590 tons of scrap or a total of 1028 tons in the year. During the same period you shipped finished castings to the extent of 765 tons. With the increased inventory of 20 tons of pig iron and 8 tons of scrap, the amount of accountable iron is 793 tons. Taking 793 tons from 1028 tons leaves a difference of 235 tons, or 22.8 per cent which apparently has disappeared.

Under normal conditions the average melting loss, including oxidation, nonrecoverable spills and shot, iron in the dump, fins, stumps, etc., in the cleaning room, amounts to approximately 5 per cent. In your case that would be about 52 tons instead of the 235 tons shown on your report. In extreme cases the melting loss including the various items outlined may amount to 10 per cent, but that is exceptional.

At the opposite extreme as pointed out by the late J. A. Lanigan in the Jan. 15, 1936 issue of THE FOUNDRY, the actual melting loss on most of the material charged into the cupola is less than 1.00 per cent. Materials showing a melting loss higher than 1.00 per cent include: Clean stove plate 2.75 per cent, rusty stove plate 5.85 per cent, cast iron briquets alone 2.01 per cent, borings in containers 3.01 per cent. The foregoing represents the melting loss alone, that is the iron actually lost in the melting process. The figures were secured in an exhaustive series of tests extending over a period of six months.

Gas Burner Casting Develops Blows

We are enclosing the sketch of some gas burner castings which we are producing. We find that the iron does not lay on the four ½-inch extra heavy steel pipes although they have been coated with all types of material except tin.

Several vital pieces of information are lacking in your inquiry. While you mention that you have used a variety of coating compounds, you do not indicate whether or not the coating is applied to the pipe as purchased, or if the pipe is cleaned by sandblasting or other means, and then coated. The pipe must be absolutely clean and dry, or the metal will tend to blow.

Also you did not state how long the molds remain covered before the metal is poured. If the sand is

Iron does not lay quietly on the extra heavy steel pipe placed in the mold cavity

warmer than the pipes, moisture will condense on the pipes. Pour the molds as soon as they are laid up. Warming the pipes before they are placed in the mold, or after they are in position with a blowtorch may be worthwhile.

We notice that there is only a wall of metal ¼-inch thick on the outside section of the pipes, and presumably that is where the blowing occurs, due to the fact that the metal cools before it has time to warm the pipes. You do not mention how the casting is gated, but the ideal way would be to have the hottest metal at the top. In other words use a row of pop gates along the tops of both legs. However, that may lead to other difficulties since the design of the casting is such that the molten metal does not have a straight drop due to the pipes. The other alternative is to use a single row of pop gates along the center. Hot metal flows into each leg with the hottest metal on top until the lower pipe is covered. Reason for the suggestion of hottest metal on top is to gain as much heat as possible from the molten metal to preheat the pipes.

Seacoal First Came From England

In a past issue of THE FOUNDRY reference is made to seacoal in an article entitled *Cement Used as Binding Agent in Gray Iron Foundry*. What is seacoal? At first we assumed that it is soft coal as contrasted with anthracite, but later in the article the statement is made that there is no combustible material in the facing mixture.

Seacoal is a high volatile, bituminous coal, ground to various degrees of fineness and mixed with the facing sand which comes into immediate contact with the molten iron. As with many other words in foundry nomenclature, the term seacoal came to this country from England in early colonial times and has persisted down to the present. In mixing facing sand, some long forgotten British foundrymen discovered that coal from a certain Welsh seam showed the most satisfactory effect on the castings. This seam was near the coast and the workings, then as now, extended under the sea.

The name seacoal was adopted to differentiate this coal from the coal mined in other districts. In the early days of American foundry practice coal was imported from England to mix with the facing sand. This also was a factor in perpetuating the name, even though domestic coal long since has displaced foreign importations. In some places the material is referred to as coal dust or mineral facing. In comparatively recent years where the material is employed as a fuel the universally accepted term is pulverized coal.

Addition of seacoal to the facing sand imparts a smooth skin to the casting. The subject resents so many ramifications and has been covered so extensively in technical literature that it would be idle to attempt to cover it in the brief space at our disposal. Effect of the material is so well known and therefore taken for granted that it explains the apparent slip in stating that no combustible material is contained in the cement facing mixture. To be perfectly accurate the statement should have been that no deleterious combustible material is present.

Makes Lead-Copper Bearing Alloy

We have developed a process for amalgamating lead and copper without the use of other metals, and many foundrymen and metallurgists doubt our veracity, believing that it is an impossibility. We have made tests of its performance within our scope operating 5000 revolutions per minute for 8 consecutive hours without any lubricant. Has this metal any value in your opinion, and can you give any suggestions as to type of tests to apply?

It is possible with the proper technique to make a mixture of lead and copper containing up to 50 per cent of each without any other metal. However, if sulphur, in the form of stick sulphur or a combination of barium sulphate and charcoal, is added, the technique is simplified considerably. So far as we know, lead, above a relatively small quantity, forms only a mechanical mixture with copper. That may be ascertained easily by examining a

(*Concluded on page* 52)

FOUNDRIES make more progress selling cams, gears and pulleys, not at competitive price per pound, but on the basis of *lower cost per year* to the user. The actual cost of replacing a worn or broken cam or gear is much greater than the price of a new casting. Point out cost of replacement labor and loss from stoppage of production. That sells tougher, long wearing Nickel alloyed castings.

Up in Bath, Maine, the Hyde Windlass Co. cast the 4 foot eccentric cams pictured above. New England thriftiness is assured by adding 1.80% Nickel, 0.30% Cr. and 0.45% Mo. to a suitably adjusted base iron. Long wear is indicated by a Brinell hardness value of 300.

Plain iron castings will stand ordinary service but severe wear, sudden overloads and shocks—common to most production processes — call for Nickel alloyed irons. Even in as-cast condition, irons strengthened and toughened by the addition of Nickel deliver several times the service of plain iron. The uniform grain structure of Nickel irons facilitates heat treatment to develop maximum mechanical properties.

CAST NICKEL IRONS

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK, N. Y.

(*Concluded from page* 50)

polished specimen under the microscope which will show lead globules interspersed in the copper. The fineness and uniformity of distribution of the lead depends upon the technique employed.

While lead increases the antifrictional properties of bearing bronzes, a straight copper-lead mixture usually does not possess the necessary strength to withstand higher pressures (squeezes out under load), and therefore, its applications are limited. In addition the lead tends to flow under elevated temperatures. Consequently, in addition to the copper and lead, some other metal which will harden the copper is required to stiffen it to withstand loading. Usually, tin in appreciable amount is the element used, although a small amount of tin with manganese and iron also will harden the copper. With high lead, it is necessary to limit the amount of tin to prevent segregation of the lead. Work of Dr. Clamer some 30 years ago indicated that the tin content should not be greater than 9/91 of the copper content.

We are not familiar with all phases of bearing problems, and consequently cannot suggest a comprehensive series of tests. However, we believe that they should include wear resistance with and without lubrication under rolling and sliding friction and combinations of the two, impact resistance, and pounding resistance under different temperatures ranging from ordinary room up to as high as 600 degrees Fahr. Such tests, of course, require special equipment and services of an individual skilled in its use, and the ability to interpret the results obtained.

Want Wash for Core In Bronze Casting

We are having trouble with the cores burning in on a bronze turret casting weighing 375 pounds and made from the following composition: Copper 80 per cent, tin 10 per cent, lead 10 per cent and phosphorus 0.2 to 0.4 per cent. The mold is made in green sand (Albany No. 2) and the metal is poured at a temperature of 1900 degrees Fahr. What is the best material for coating the cores? Should they be recoated after they are dried?

The data submitted is not sufficient on which to base a specific answer. The weight of the casting is not a pertinent factor. Presumably a 375-pound casting might be only ¼-inch thick, and then again it might be 3 or 4 inches thick. Manifestly a casting ¼-inch thick and spread over a large area will not burn the sand to the same extent as a casting 3 or 4 inches thick where the metal remains liquid for a comparatively long period.

Also we do not know whether you are referring to one large main core, or to several smaller cores almost entirely surrounded by metal. In the first instance the effect of the hot metal will not be as severe as in the second instance. The lead and phosphorus in this particular metal impart a *searching* quality that is not present in other bronzes.

Where a core is made entirely of sharp sand, the metal enters the small intertices between the grains and produces a rough surface. Addition of a certain amount of molding sand to the mixture tends to overcome this trouble. However, addition of molding sand reduces the permeability and that is a feature which must be adapted to suit the general size and shape of the core, and more particularly the extent to which it is surrounded by metal. Larger and more numerous artificial vent passages will have to be provided. The cores should be coated with a good grade of plumbago or silica wash preferably two coats, one while the core is green, and another after the core is dried.

Describes Practice For Medium Cupola

We are operating a 42-inch diameter cupola equipped with six 4½ x 14½-inch tuyeres. The usual iron charge is 1500 pounds made up of 800 pounds pig iron, 600 pounds scrap and 100 pounds steel. One or two charges at the beginning of the heat usually contain 500 pounds steel scrap. Most of our castings are valves which have to withstand high pressures and which therefore must be poured with hot metal. Accustomed to the foundry coke of the Mid-west, the coke in this district seems to be unusually light in weight. We shall appreciate your opinion on our present set up and practice, also how long should it take to run off a heat of 25,000 to 30,000 pounds.

Your cupola as at present constructed and operated conforms to standard practice as observed in the majority of gray iron foundries. However, your reference to a light weight coke introduces a variable factor that may or may not necessitate changes either in construction or mode of operation. Offhand we should say that if the iron is hot enough and coming down in reasonable time, then the present method is satisfactory and should not be changed. Melting speed is desirable, but it is a mistake to sacrifice either temperature or quality to speed.

The same is true in reference to the amount of coke required to melt a definite quantity of iron. In the long run, prodigality with coke pays better than pinch penny economy. Answering your specific questions a 42-inch cupola has a melting capacity of 7 tons per hour. With your light coke and (probably) thicker splits this might be reduced to 6 tons per hour. This would mean a trifle over 2 hours for a 25,000-pound heat and 2½ hours for a 30,000 pound heat, reckoned from the time the first iron appears. Weight of coke on the bed depends on the height of the tuyeres. The bed should extend to a point 36 inches above the tuyeres. With the present coke you possibly might improve conditions with 1000-pound iron charges and 125-pound coke charges.

Sand Permeability Is Too Low

We are forwarding a piece of gray iron cut from piston stock 3½ x 6 inches. Many of our castings show similar defects; nests of pockets which do not appear until the casting is partly machined. Our cupola lined to 42 inches is provided with six 5 x 6-inch tuyeres and receives 23,400 cubic feet of air per hour from a positive pressure blower. We melt from 6 to 7 tons per hour. First metal appears 10 minutes after the blower is started. The coke bed extends 30 inches above the tuyeres and is lighted with a torch. Each charge includes 700 pounds pig iron, 700 pounds machinery scrap and 100 pounds rail scrap with 200 pounds coke and 20 pounds limestone.

Your cupola practice apparently is satisfactory and is no way responsible for the type of defect shown in the sample of casting submitted. A minor criticism is that the iron is much softer than would be required for that particular casting. The volume of limestone is considerably less than usually employed. However, apparently it is sufficient in your case since the metal is hot throughout the heat. On long heats we should anticipate the formation of a considerable bridge on the inside of the cupola, with resultant drop in temperature and speed of melting.

Defect in the casting submitted for examination is caused by lack of permeability in the sand. In foundry parlance it is *too tight*. Possibly also, it may contain excessive moisture. The combination develops steam which cannot escape readily through the sand walls and a certain amount enters the metal. Most of it escapes before the metal solidifies, but before escaping it freezes the metal in the vicinity into thin walls which prevent the surrounding metal from filling the voids after the steam has worked out. You can verify this by pouring a casting in open sand.

*STEEL FOUNDRY**

CUTS BINDER COST USES BLACK SAND SLASHES BAKING TIME

with TRULINE BINDER**

*A typical example of the savings and improvements in foundry practice made possible by Truline Binder — another reason for the phenomenal growth of Truline Binder sales.

HERE'S HOW a well-known steel foundry cut costs with Truline Binder:

FIRST: Cost of Truline Binder was less than half the cost of the binder replaced. **That's a saving, isn't it?**

SECOND: 70% of black sand was used in the mix. **How's that for a big saving?**

THIRD: Baking time was cut 1½ hours. **Another big saving!**

So it goes. In foundry after foundry, Truline Binder is cutting costs, producing better cores, and speeding up work. The advantages listed at the right will show how you, too, can save money by using Truline Binder.

**Reg. U. S. Pat. Off. by Hercules Powder Company

Advantages of TRULINE BINDER

- Low initial cost.
- Pulverized to a uniform fineness.
- Does not absorb moisture.
- Makes strong cores that will not warp.
- Makes permeable cores that burn out after metal is poured.
- Reduces cleaning costs.
- Helps to eliminate cracks, especially in high-shrinkage castings.
- Helps to produce smooth, strong castings.
- CAN BE USED WHEREVER METALS ARE CAST

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JJ-22

MEN of INDUSTRY

TRICE DAVIS, formerly director of manufacture, Naugatuck Works, Eastern Malleable Iron Co., Naugatuck, Conn., has been made managing director of that works in charge of both production and sales.

GEORGE E. BEAN formerly director of sales, Eastern Malleable Iron Co. has been made managing director of the Wilmington, Del. works of that company in charge of both production and sales.

♦ ♦ ♦

KARL C. PROVANCE, has become associated with the Urick Foundry Co., Erie, Pa., in a sales capacity. He formerly was with Koppel Industrial Car & Equipment Co., Koppel, Pa.

♦ ♦ ♦

WILLIAM A. SCHEUCH, works manager, Nassau Smelting & Refining Co. Inc., subsidiary of Western Electric Co., was elected a vice president of the Nassau company at the annual meeting of the board of directors April 11. Mr. Scheuch has served as works manager of the Staten Island plant since 1931.

♦ ♦ ♦

W. W. PEATTIE, president, Northern Engineering Works, Detroit, recently was elected chairman of the Electric Hoist Manufacturers' association at its twenty-second annual meeting held in New York. William White, secretary and general manager, Euclid Crane & Hoist Co., Euclid, O., was elected vice chairman of the association.

♦ ♦ ♦

ROBERT E. ADAMS and W. G. N. HEER, research engineers have been added to the technical staff of Battelle Memorial institute, Columbus, O., as announced by Clyde E. Williams, director. Both have been assigned to the process metallurgy division. Mr. Adams is a recent graduate of the University of Wisconsin. Mr. Heer is a graduate of metallurgy, University of Alabama, and previously was associated with the Tennessee Coal, Iron & Railroad Co.

ARTHUR E. BEARSE, chemist, and HOWARD PETERS, metallurgist, recently have been added to the technical staff of Battelle Memorial institute. Dr. Bearse has been assigned to the industrial chemistry division and Mr. Peters to research in nonferrous metallurgy. Dr. Bearse, who received his post-graduate degree from Massachusetts Institute of Technology, formerly was associated with Arthur D. Little, Inc., consulting engineers and chemists, Cambridge, Mass. Previously he had been at the Jackson laboratory of E. I. du Pont de Nemours & Co. Mr. Peters, a Purdue graduate formerly was with the Central Indiana Gas Co. and had previously carried on research for the Indiana Gas association.

♦ ♦ ♦

GEORGE B. BLAKE, Newburyport, Mass., recently celebrated a birthday anniversary. Not the ordinary ten-twenth-thirth type of birthday which requires practically no effort, but a real birthday, to wit, his 77th. And how, you may ask did George mark this mile stone in the long line that extends back to the year the first omnious gun was fired at Fort Sumter. He marked it by calmly going to work at his usual occupation in the foundry of Albert Russell & Sons, Co., Newburyport, Mass. Still more remarkable to relate he has celebrated other birthdays in a similar manner to the number of 59 in the same old plant, in the same old New England town down by the sea. The rumor has not been actually and officially confirmed, but in well informed circles it is hinted that the firm regards Mr. Blake as a steady, reliable workman immune alike to silicosis and wanderitis.

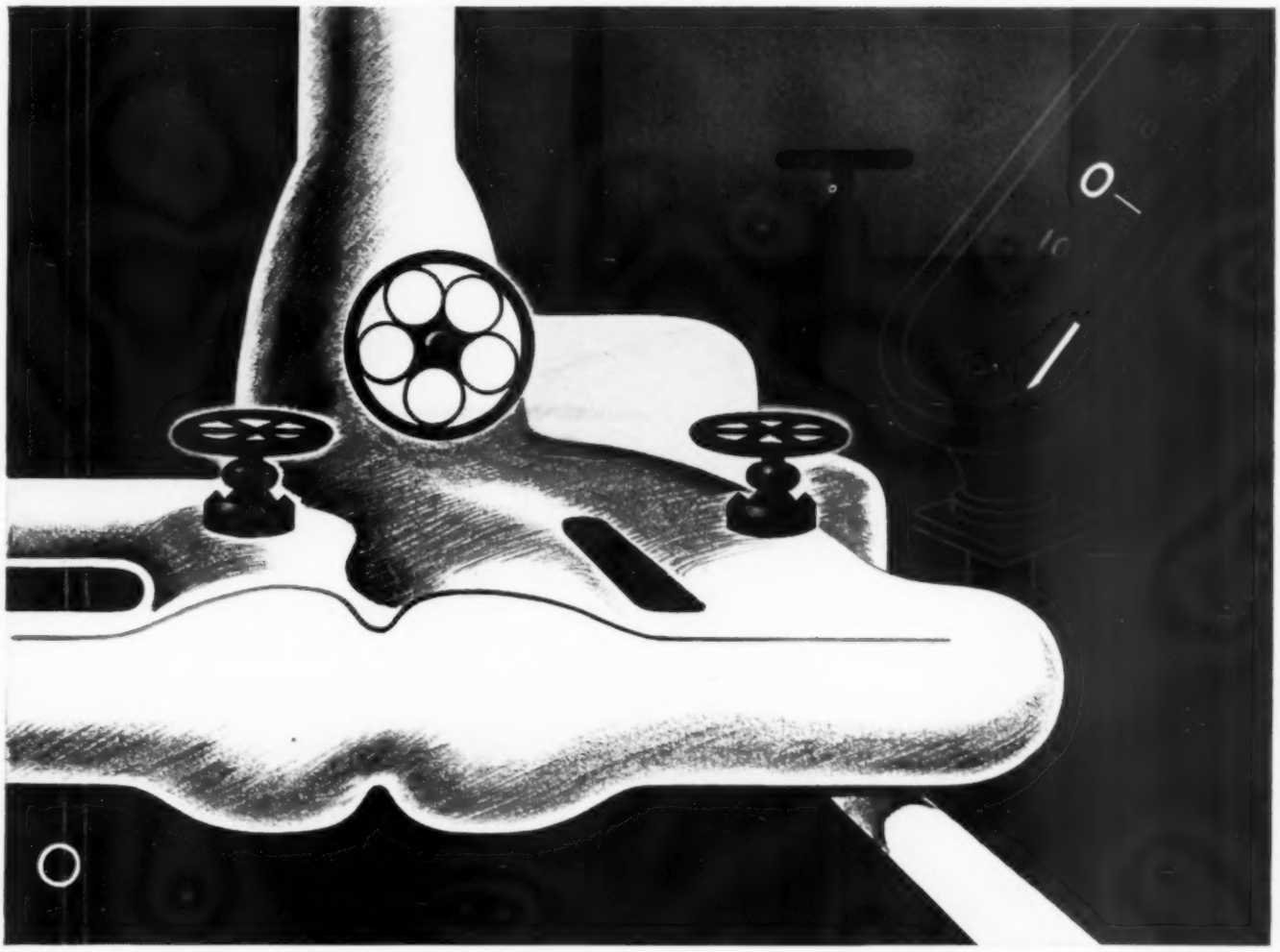
♦ ♦ ♦

JEAN LOBSTEIN, honorary president, Syndicat General des Fondeurs de France, and managing director, Usines Lobstein, Argenteuil, near Paris, has been elected president, Association Technique de Fonderie (of France) for the year 1939-40. PIERRE CHEVENARD, research director, Usines de la Societe de Commentry-Fourchambault-Decazeville, and professor, Ecole Superieure de Fonderie, was elected first vice-president.

The following were elected vice-presidents: PAUL BASTEIN, Ecole Centrale, assistant manager of practical works, and Ecole Nationale Superieure de l'Aeronautique, and consulting engineer; JEAN DERDINGER, honorary president, Chambre Syndicale des Fondeurs en Cuivre et Bronze de France, professor, Ecole Superieure de Fonderie, and nonferrous foundry owner; CHARLES KOEHLER, president, Societe Auxiliaire de l'Enseignement Technique and of Societe des Anciens Eleves des Ecoles Nationales d'Arts et Metiers, general secretary, Syndicat General des Fondeurs de France, and chairman, Societe des Fonderies de Saint-Ouen; ROGER R. MEYER, Societe de Produits Metallurgiques; LEON MONTUPET, managing director, Fonderies Montupet; AUGUSTIN ROUSSEAU, president, Association Amicale et Mutuelle de Fonderie, managing director, Societe d'Editions Techniques, and director, *La Revue de Fonderie Moderne;* and HENRY STRUBE, president, Syndicat des Fondeurs de la Region Parisienne, and foundry owner.

The following representatives of foreign associations were elected vice-presidents as representing their respective countries: For the Grand Duchy of Luxemburg: LEON BRASSEUR, engineer; for Spain: J. M. ESPANA, honorary commercial attache for Spain in Paris; for Belgium: JOSEPH LEONARD, past-president, Association Technique de Fonderie de Belgique, and director of Societe d'Angleur-Athus; for Italy: GUIDO VANZETTI, president, International Committee of Foundry Technical Associations, and managing director of Fonderia Milanese di Acciaio Vanzetti.

The general secretary is CHARLES DENNERY, engineer, Ecole Centrale de Paris, and the treasurer is DANIEL WAELES, president, Apprenticeship Commission for the Foundry Industry of the Paris District.



OUT OF DATE—OUT OF POCKET

... may be literally true unless your material specifications include Molybdenum steels. Present production problems and costs demand these improved materials. Here is one of Moly steel's many successes.

A manufacturer of a large line of valves for operation at sub-zero temperatures required a steel having good impact properties at temperatures down to 150 degrees below zero F. Many different parts were involved.

Chrome-Molybdenum (SAE 4140) steel is standard in this case because of its established ability to meet strict low temperature impact specifications.

In addition this Chrome-Moly steel is keeping material and production costs within competitive limits. It is yielding the additional profit that always comes from standardization. Substantial fabrication economies are also being obtained.

Our technical books "Molybdenum in Steel" and "Molybdenum in Cast Iron" which contain a great deal of practical data are free to any interested production executive or engineer on request.

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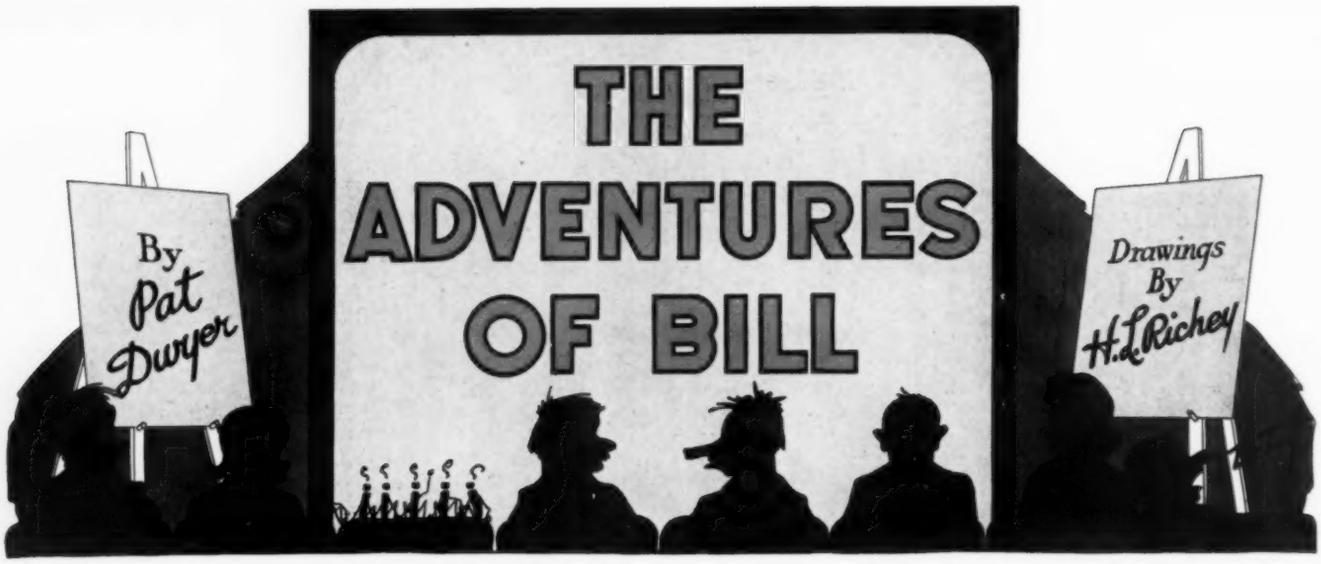
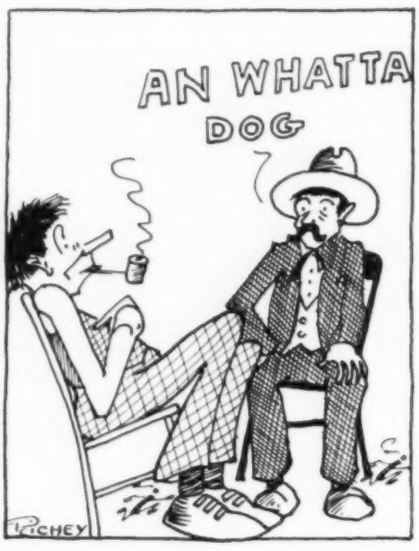


TIME," said Bill, "is a remarkably funny thing. In the life of a young lad looking backward or forward, a year is an extremely long period. Looking forward from one Christmas to another he doubts if he can make the grade. The twelve long months loom up like so many high mountains to be climbed slowly and painfully. At the end of the year he looks backward over the long road and finds that some of the events are already fading from memory. As he grows older the years in some miraculous manner grow shorter and shorter and he is hardly through paying for one set of Christmas bills until another set is dumped into his lap."

"Why the long face and the pessimistic attitude?" I asked. "Christmas has come and gone and you have seven or eight months of comparative peace and comfort before you are once more put through the financial wringer. Here we are at the beginning of summer, crocuses and daffydown-dillies jumping out of the ground, young lambs gambolling on the green, trees and bushes breaking out in green rash and honest householders on all sides oiling the old lawnmowers and waking up the neighbors with their infernal din before even robins have had a preliminary look at the breakfast menu. Instead of sitting there wrapped in a mantle of gloom, croaking like an anemic raven with the stomach ache, you should be perched on the top rail of the fence whistling like a blinkin' lark."

"A fat lot you know about larks. If I had the time and the inclination I could show you at least 47 references to your friend the lark and not a single one of the 47 says a word about the little blighter sitting on a rail fence. I don't believe he has any feet. Invariably he is described as on wing. Must be a kind of a hobo like the old time molder who in addition to being on the wing, also was on the bum. All he needed was a card and a due book, a trowel and a double ender in his back pocket and he was equipped to ramble foot loose and fancy free from the rock bound coast of Maine to where the long Pacific rollers shiver into a shower of silver spray on the sun kissed sands of Cal-i-for-ni-ay.

"However, leaving larks and hoboes and other red herrings out of the present discussion, what I had in mind was the coming convention in Cincinnati, invariably referred to as Cincy by the boys who have been through there and as Cincinnatah by most of the inhabitants of the Middle West. Incidentally I often have wondered how the mispronouncement of the names of many towns originated, and often wondered still more why these mispronouncements persist, especially in recent years with practically all the population on wheels rolling all over the country presumably picking up information of one kind or another."



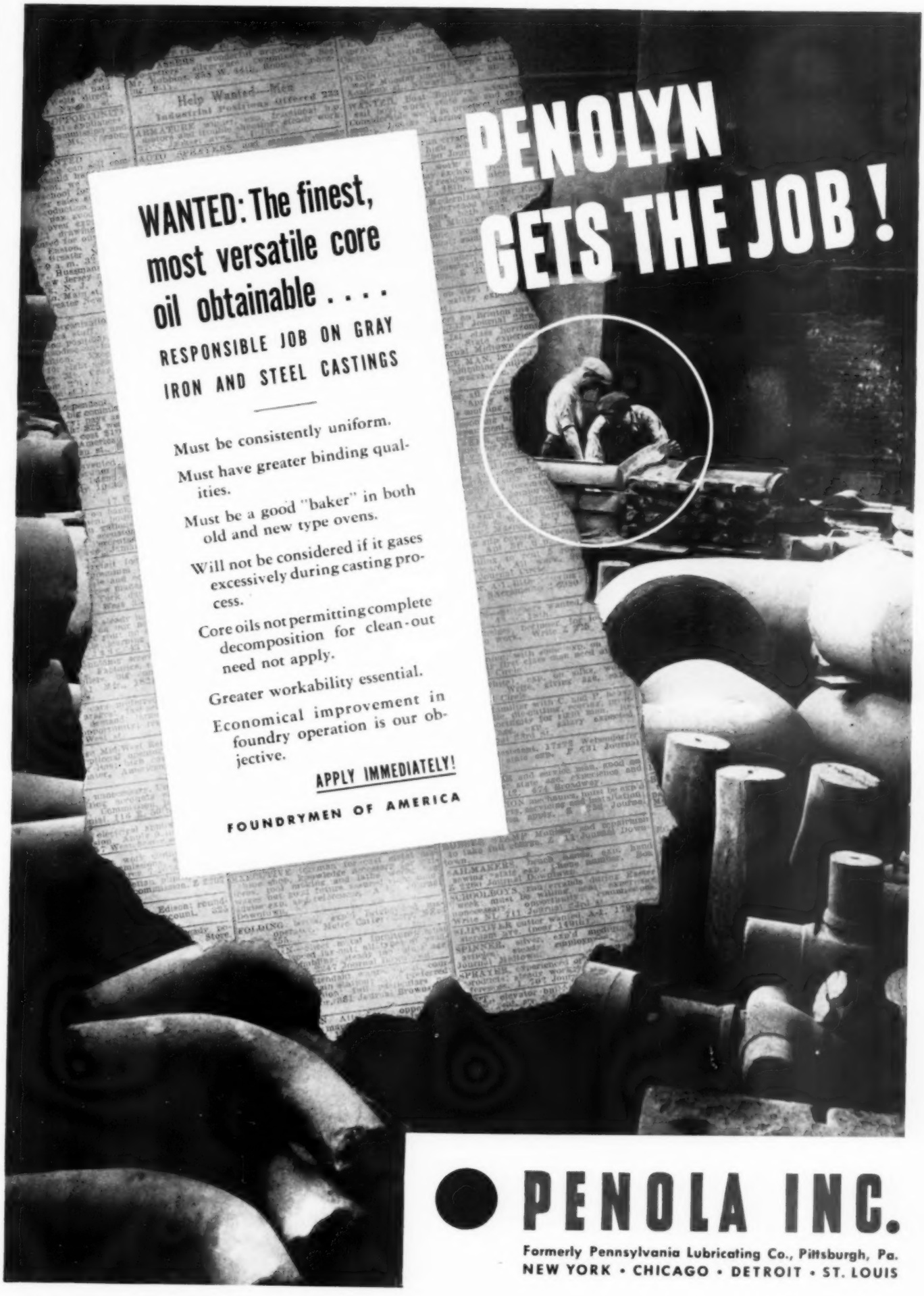
Most remarkable dog in Alabama

"You are overlooking one factor my dear young tourist, a factor that knocks the props from under the popular belief that one is broadened by traveling. The average tourist may become broader in one respect from constant jolting in the old jaloppy, but being exposed to knowledge and culture, and absorbing those things are two entirely different forms of experience. A tin canner whizzing across the country with one eye on the speedometer and the other on the traffic lights takes a lot of misinformation with him, and brings back exactly the same amount. Any person with sufficient patience to listen, will learn that our hero has been in Philly, Shecargo, Dee-troit, Sinlooey, Cincinnatah, Missourah, Omahar, Frisco and L. A. The little woman, more amenable than Joe to the cultural influence of travel will refer casually to Los Ang-leeze, but brave Joe whose only remembrance of Los Angeles centers around a more or less acriminous conversation with a traffic cop, always will refer to the cinema capital as L. A."

"Ah, yes, my good man. Quite—at—interesting. I was afraid at one time you were going to take up some of the weird and wonderful names scattered over New England. They are spelled one way and almost invariably pronounced another way. Seems to me that is carrying caution and conservatism too far. Were you ever in Peabody, Mass.? Ask any person up in that part of the country about Peabody and he'll say, 'Oh, you mean Pibidy!' to rhyme with Jiminy when a fella's nose is stopped with a cold.

"Say, who started this argument about names? I started to talk about the flight of time, heavy and slow in the early years like a heron with a stomach full of fish taking off from shallow water, and growing increasingly swifter as we grow older. Recently the years more

(*Continued on page* 58)

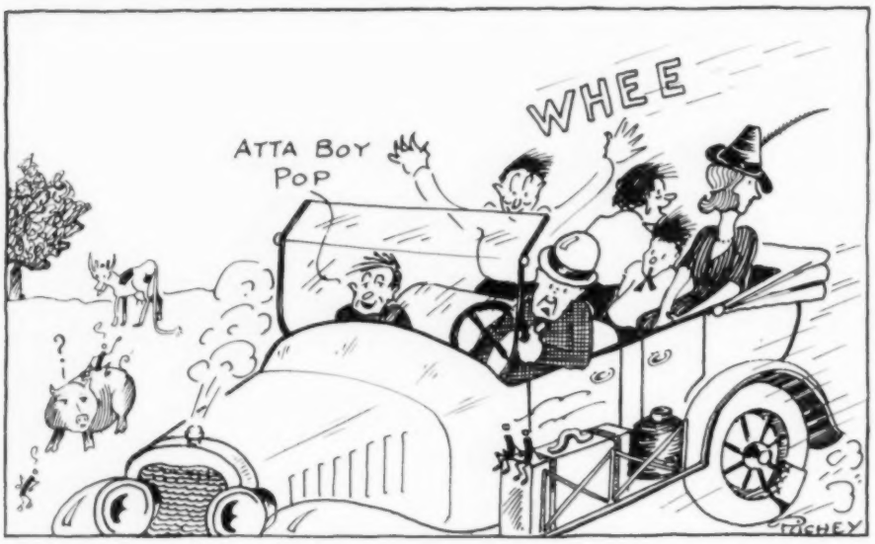

PENOLYN GETS THE JOB!
WANTED: The finest, most versatile core oil obtainable . . . .
RESPONSIBLE JOB ON GRAY IRON AND STEEL CASTINGS
Must be consistently uniform.
Must have greater binding qualities.
Must be a good "baker" in both old and new type ovens.
Will not be considered if it gases excessively during casting process.
Core oils not permitting complete decomposition for clean-out need not apply.
Greater workability essential.
Economical improvement in foundry operation is our objective.
APPLY IMMEDIATELY!
FOUNDRYMEN OF AMERICA

PENOLA INC.
Formerly Pennsylvania Lubricating Co., Pittsburgh, Pa.
NEW YORK • CHICAGO • DETROIT • ST. LOUIS

(*Continued from page* 56)

nearly resemble the whizzing flight of a grouse or woodcock. He springs from under your feet and before you can swing a gun to your shoulder he is out of sight.

"That reminds me of a story I heard recently at a foundry conference in Birmingham. For that matter I heard a number of stories, most of them old friends, tried and trusty old veterans that have been doing yoeman duty since probably long before my time. Fortunately men's memories are short. The vaudeville boys capitalized on this feature for many years and now the radio lads are fishing the old chestnuts out of the dead and forgotten ashes of ancient vaudeville camp fires, dusting them off and handing them out as brilliant bon mots of their own exclusive creation.



Paw still has moments of terror while bowling along the broad highway

"This story, I have in mind is about a dog."

"You can stop right now," I said. "I have read or heard two, possibly three good dog stories. I have read or heard hundreds of dog stories that are absolute tripe. I would not give a dime for a bushel basket filled to the brim. I got the fright of my life when I was a child. I thought a great big hairy mongrel brute all eyes and teeth was going to swallow me body and bones. If I thought I never should see another dog, it still would be too soon. Man's best friend and all that kind of stuff leave me absolutely cold. In a word my dear young fella you can keep your dog in the dog house. I do not want to share it with him. Confidentially, as what's-his-name said in a recent picture he—the dog I mean—well, he's no carnation and I have a delicate nose."

"All of which," Bill observed placidly, "goes to show that you never have grown up. When I was a young gossoon I had a mortal terror of dogs, geese, cows, dark rooms, cemeteries and an old schoolmaster with bushy whiskers and a pair of mean little eyes like those you see in a duck. Gradually I learned that a well aimed rock whanged against the ribs of any of the first three reversed our positions. Dark rooms lost their terror about the time I put on the first pair of pants. The cemetery up on the hill became a familiar hunting ground after I commenced collecting bird's eggs. The schoolmaster finally died and I had the pleasure of marching in the funeral procession. A few years afterward I went into the foundry and became associated with a bunch of hairy, husky lads who had been every where, had seen everything and had no fear of anything in the heavens above, the earth beneath or the waters under the earth. Before I was through serving my time I was scared of nothing, not even the autocratic gaffer, with a body and voice like those of an auroch bull, a full beard and the instincts and mannerisms of a sergeant of marines."

"I thought this was going to be a story about a dog. You know, d-o-g, a small quadruped usually fastened to the end of a leash. The other end fastened to the hand of a more or less furtive individual moodily walking around the block morning and night. Did you ever read O. Henry's story *Make it Two?* Now there is a story."

"Certainly this is a story about a dog. Probably the most remarkable dog since the days when Hector was a pup, and that was longer ago than I could tell you, and twice as long ago as you could tell me.

"The hound of the Baskerville's was quite a dog. Bob son of Battle has a place in the hall of fame. Ernest Seton-Thompson hobnobbed with several notorious members of the canine race. Albert Payson Terhune has been writing about his dog pals since before the war. St. Bernard dogs built up quite a reputation carrying small snacks and a nip of brandy to lads who fell over precipices, got caught in snow slides, or who simply became discouraged climbing up the side of a mountain and crept into a convenient snow drift for the night. This dog I heard of recently was as far ahead of all these old timers as the modern stream lined phantom of the rails is ahead of Stevenson's Rocket. Just for the sake of the argument I am willing to include Brannigan's Pup, and the legendary country dog who put all the city dogs to shame on a certain occasion.

"The owner of this dog of dogs had to leave home and go on an extended journey. He asked a friend to take the dog into his house, to cherish him, feed him, cling to him in sickness and health and all that kind of stuff usually found only in the old fashioned marriage ritual. The friend who was a bit of a dog man himself readily agreed to do all these things and even more should the contingency arise.

"A few days after the dog came into his possession he donned the long boots and the leather coat, filled his pockets with shells and sallied out with a laudable intention of planting a pinch of bird shot in as many innocent creatures as possible, thereby depriving them of life, liberty and the pursuit of happiness. The dog apparently was delighted at the prospect and gambolled merrily in front.

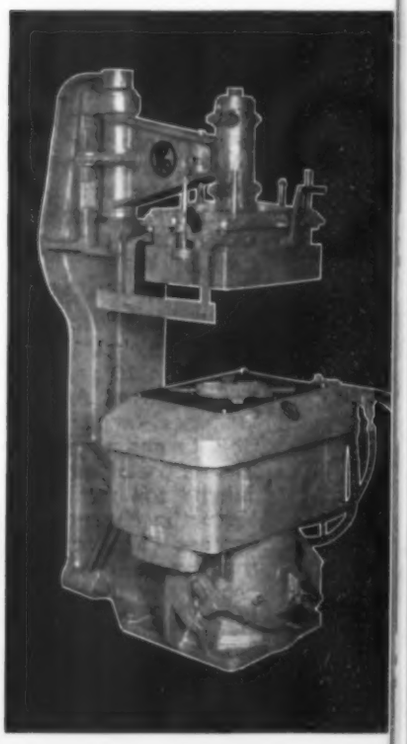
"While passing a dense growth of bushes CIO suddenly stopped, stiffened into a straight line and raised one foot from the ground. CIO? That was the dog's name. He was a setter. I wish you would stop asking trivial questions. He held the pose for a few seconds and then looked around at the gunner as much as to say, 'Well, here we are. I am going to do my part. See that you do your's. He was of English descent on the mother's side and was thinking of Nelson's famous signal at Trafalgar. 'This day England expects every man to do his duty!'

"The dog crept forward and eased himself into the bushes while the hunter held himself in readiness to knock down at least a part of the anticipated covey. With a great whirr of wings one bird soared aloft and promptly was removed from the active list. Hardly had the hunter slipped a fresh shell into the breach when a second bird popped out of the bushes. This bird joined the first. After he had disposed of half a dozen with clock-

(*Concluded on page* 97)

He knows the game—he's Played it!

The SPO Oscillating Squeeze Strip Machine eliminates the jolting operation, thereby increasing production as much as 50%.



We ought to know the foundry game—we've played it countless times. In production foundries SPO men have turned out thousands of castings. SPO equipment is the outcome. Our own experience has showed us where improvements could be made—*and we made them.* SPO machines are credited with having helped to bring casting tolerances down to .005" . . . Users have been kind enough to tell us that SPO engineers have originated the major advances in molding machines during the last two decades. Write for our catalog.

SPO

INCORPORATED

Foundry Engineers and Equipment Manufacturers

EAST 61st STREET and WATERMAN AVE., CLEVELAND, OHIO

VIEWING Foundry Developments AT SHORT RANGE

MOISTURE control of a core sand mix is essential in production of uniform cores. Insufficient moisture results in a core with low green and baked strength and also with a soft surface. Excess moisture results in a low green strength, but the dry strength is high, and the surface hard. When the core sand mixture is too wet it will stick to the corebox causing rough and loose core surfaces.

* * *

A standard free machining bronze used for common hydraulic pressure castings contains 83 per cent copper, 4 per cent tin, 6 per cent lead and 7 per cent zinc. It has a minimum tensile strength of 33,000 pounds per square inch, an elongation of 18 per cent in 2 inches, melting point of 1795 degrees Fahr., and weighs 0.314 pounds per cubic inch. Foundry practice is not difficult and it machines easily.

* * *

It is claimed that a molding sand which has been aerated properly, is more open or has a higher permeability after ramming than one which has not been subjected to aeration. Hence, it is possible to use a finer sand when aeration is used. This produces a better surface finish on the castings.

* * *

Cupro-nickel alloys containing from 4 to 10 per cent nickel, which are employed for various electrical purposes, are particularly susceptible to gas absorption during melting. Special precautions must be taken to minimize that action. Keep the charge away from incandescent coke or charcoal. Placing manganese ore equal to about 3 per cent of the weight of the charge in the bottom of the crucible provides necessary oxidizing atmosphere during melting. After the alloy is melted and superheated to over 2560 degrees Fahr., it should be deoxidized with 1¾ ounces of pure metallic manganese per 100 pounds of metal. Deoxidizer should be plunged and held beneath the surface and that operation performed at least 5 minutes before drawing the metal from the furnace.

* * *

Three recently developed types of meehanite iron have resulted from co-operative research. They include a super hard wearing type, an alloyed type, and a high tensile strength type iron running 60,000 pounds per square inch which is claimed to have unusual hardness yet readily machinable.

* * *

DEGREE of warp in a casting usually is a function of design, and may be lessened only by pattern changes or gating locations. In some cases it is necessary to warp the pattern in the opposite direction to get straight castings. Those conditions can be corrected best by experiment in the foundry through experience.

* * *

It is claimed that magnesium alloys have given excellent results in coreboxes used on core blowing machines. In one case almost 2,500,000 crankcase cores have been taken from a single box by a motor car manufacturer.

* * *

A statement has been made that a sulphur content of 0.200 per cent is not detrimental to any malleable iron made by the duplex process, provided that the sulphur-manganese ratio is balanced. It also was stated that a specification requiring a minimum of 35,000 pounds per square inch yield point and 18 per cent elongation easily can be met and considerably bettered with iron of such a sulphur content.

* * *

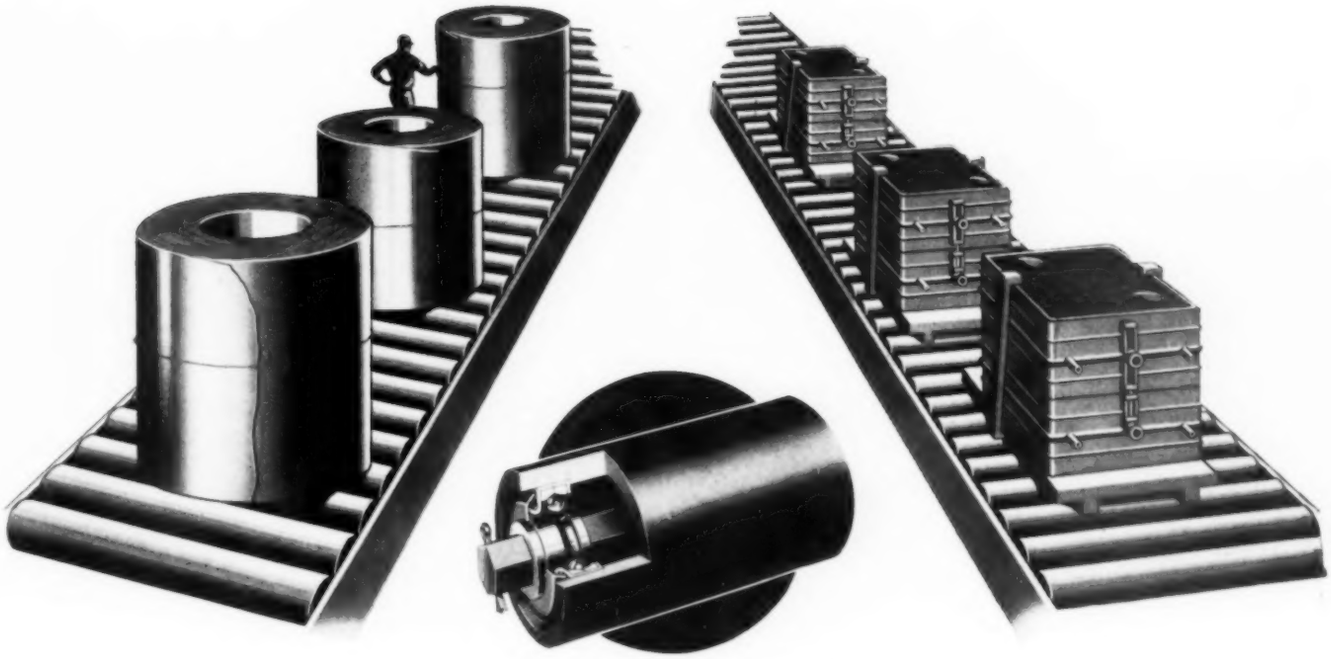
LATHE manufacturer finds in a wear test simulating actual service conditions that flame-hardened, gray cast iron lathe beds stand up extremely satisfactorily. A carriage carrying 500 pounds is moved one foot of travel by an electric motor, and in 7 months more than 6,000,000 passes have been made. A similar bed unhardened, under the same conditions shows a deep score on the inside of the front flat and on the carriage vee, and a wear of more than 0.002-inch over the entire area.

* * *

Compressed iron powders have been used for permanent molds and although rather expensive for that application, possess an advantage over the regular materials employed for that purpose. By variation of the compression applied in compacting the iron powder, the mold may be made with varying densities in different portions. Where the mold is lightly compacted, resulting in a porous section, cooling of the metal will be slow, while where highly compacted giving a dense, solid structure, metal is cooled rapidly.

* * *

Investigational work still in progress indicates copper and silver containing small amounts of beryllium or aluminum can be prevented from oxidizing and tarnishing by treating the material so that a thin film of aluminum or beryllium oxide is formed. Heating in an atmosphere of hydrogen containing a small amount of water vapor will produce the film.



Logan Bearings, Rolls and Mountings combine ruggedness with simplicity. A minimum of parts—low maintenance expense. All-steel seals. Outer shield stationary, *does not protrude beyond end of roll.*

10-ton coils of steel 2-ton foundry molds

HEAVY loads, severe shocks—it's all in the day's work, with Logan heavy-duty Roller Conveyor. Regardless of the handling job to be done, this massive equipment takes it in stride and "just keeps rollin' along."

When the proper selection of bearing type, tubing, roll spacing and frame design has been made by experienced Logan engineers—then maintenance costs are automatically negligible and trouble-free performance is a foregone conclusion. Users can forget about major replacements for a great many years to come.

Most assuredly, it is not necessary to coddle or cushion Logan Roller Conveyor. One well known foundry* writes, "Regarding the Logan roller conveyors used in our plant . . . . I hesitate to judge the life of the bearings because they have operated over 10 years, and are in good condition today." Not an unusual comment.

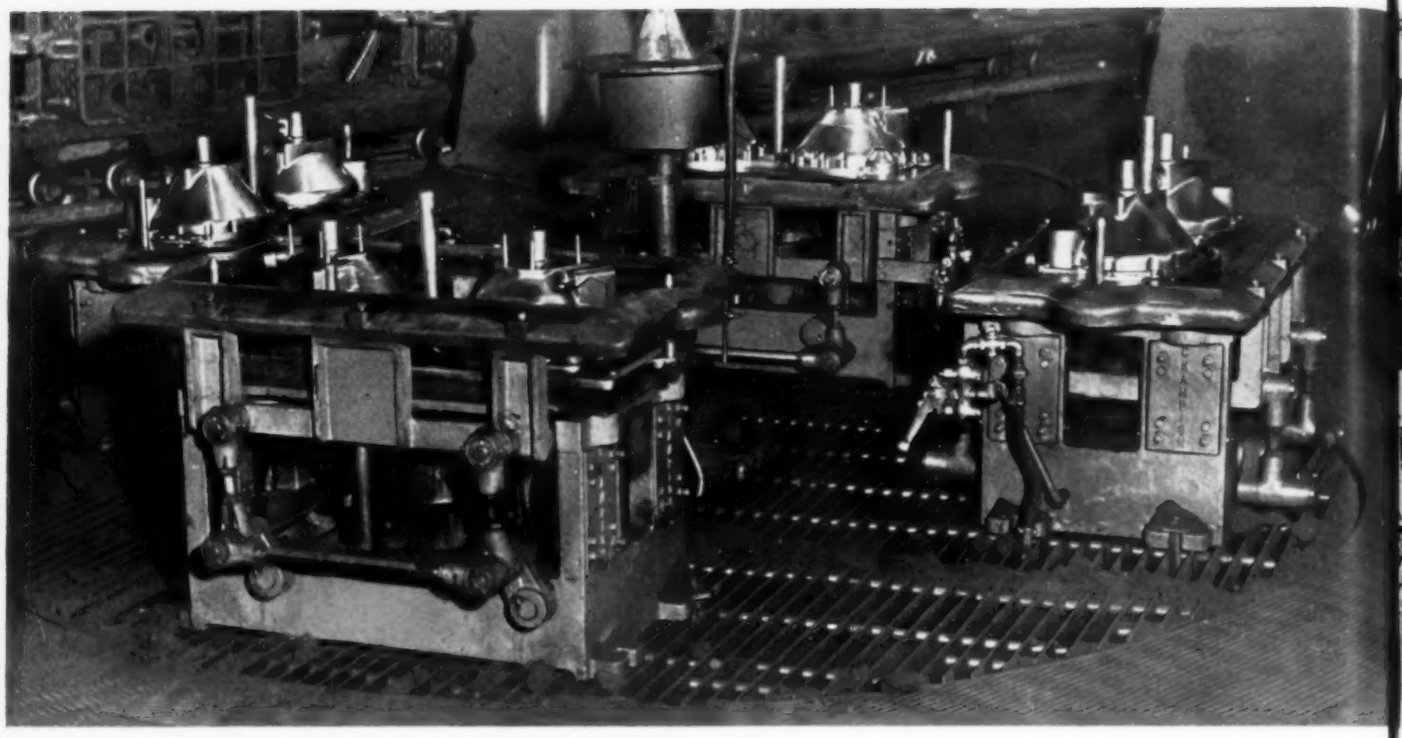
Logan offers separate books on conveyors for Foundries, Steel Mills, and general industry, as well as a bulletin on roller conveyor construction. Copies will be promptly mailed for the asking. For immediate personal service Logan engineers are conveniently located in principal cities. LOGAN CO., 580 Cabel St., Louisville, Kentucky.

*Name on request

Logan Conveyors

PUT *flow* INTO PRODUCTION

CHAMPION *Salutes*



Courtesy The Studebaker Corporation

CHAMPION MOLDING MACHINES *for*

MODERN EQUIPMENT FOR A MODERN CAR

Dependability and performance are all important qualities demanded in molding machine equipment to produce the modern car. That is why CHAMPION Power Strippers were installed by The Studebaker Corporation for the production of cylinder block, clutch housing and manifold castings for the new Studebaker Champion. Cut above shows one unit of clutch housing machines on a Sand Slinger unit.

Champion's Are Dependable . . . They Won't Let You Down

Champion Foundry & Machine Co.

CANADIAN REPRESENTATIVE — JOHN T.

CHAMPION MOLDING MACHINES ARE BACKED

...es a New CHAMPION

Courtesy The Studebaker Corporation

...or the New STUDEBAKER CHAMPION

We are gratified and proud of the fact that CHAMPION Molding Machine Equipment has a hand in the production of this new Studebaker Champion. Economical production was necessary for this low priced car. Studebaker Foundry Engineers, as have many others, justly decided on Champion Power Strippers for the required casting production. You too can benefit by our many years experience in production molding machines.

Our Engineering Department Is At Your Service

...o. 1314-16 West 21st St., Chicago, Ill.

...T. HEPBURN, LTD., TORONTO, CANADA

...ED BY OVER FORTY YEARS OF EXPERIENCE

Northern Iowa

APPROXIMATELY 180 members of the Northern Iowa Foundrymen's association, supervisors of John Deere Tractor Co. and out of town guests were present at the second annual safety meeting of the group held in Black's tea room. Herbert Rehder, safety director, John Deere Tractor Co. plant arranged the program and presided at the meeting. Mr. Rehder first introduced Gust Olson Jr., general superintendent of the John Deere plant and Ralph Slippy, mayor of Waterloo, who gave short talks.

Speaker of the evening, Earl Fyler, assistant to the manager of industrial relations, Carnegie-Illinois Steel Co., Chicago, who was introduced next first presented a film entitled "Open for Infection" which illustrated dangers of neglecting small wounds and injuries. History of the safety movement then was discussed and it was stated that industry has eliminated 90 per cent of its accidents. Safety first was promoted as a humanitarian project but the experience of industry has been that the promotion of safety programs and the installation of equipment designed to reduce accidents is sound business. Safety today is regarded as an index to industrial progress.—*R. E. Wilke, president.*

Twin City

REGULAR meeting of the Twin City Foundrymen's association was held Monday, March 20, at the St. Anthony Commercial club, Minneapolis. A buffet dinner was served to 69 members and guests after which the meeting was called to order by H. H. Blosjo, metallurgist, Minneapolis Electric Steel Castings Co., Minneapolis and president of the association.

L. P. Robinson, director of sales, Werner G. Smith Co., Cleveland discussed "Some Common Sources of Core Room Troubles." The talk was divided into nine topics as follows: Proper selection of core sands; proper selection of binders, proper ratios; proper mixing; moisture control; baking; venting; proper inspection. Mr. Robinson's talk was followed by a lively discussion which brought out many interesting and instructive points in regard to core room operation.—*O. W. Potter, secretary.*

N. Ill. and S. Wis.

REGULAR monthly meeting of the Northern Illinois and Southern Wisconsin chapter of the A.F.A. was held on Feb. 14 at Hotel Faust, Rockford, Ill. John T. Clausen presided, and approximately 60 members attended the meeting which was devoted to a round table discussion on gates and risers for gray iron castings. The discussion was led by P. A. Paulson, Gunite Foundries, Rockford, Ill., W. F. Pfanstiel, W. F. Barnes Co., Rockford, and H. J. Wade, Fairbanks, Morse & Co., Beloit, Wis.

Mr. Paulson opened the discussion with a description of some of the principles of gating using the iron-carbon diagram to explain the effects of hot and cold pouring, and of silicon and carbon on the liquid shrinkage of iron. Methods of gating to equalize the cooling rate of a casting were shown. Mr. Pfanstiel showed the gating of a large machine bed emphasizing the importance of pouring metal of uniform temperature into all parts of the casting.

Mr. Wade gave a pattern maker's viewpoint on gates and risers. After mentioning the great variety of practices in use over a period of years, he showed the gating of a very complicated diesel engine cylinder block. This was followed by descriptions of methods to mold and pour large engine bases and other castings. Many questions and comments from those present made the meeting more valuable and interesting.

March meeting of the chapter was held on March 14 at Hotel Faust, Rockford, Ill. Over 50 members of the chapter attended the meeting which was directed by John T. Clausen. R. E. Kennedy, secretary, American Foundrymen's association, Chicago, gave a short talk on the annual convention which will be held in May at Cincinnati, and extended an invitation to all to attend.

Main speaker of the evening was H. A. Deane, Deere & Co., Moline, Ill., who spoke on molding sand problems. Mr. Deane presented an interesting talk on the sand practice employed in his plant. Some of the problems he had encountered were shown and methods were described which overcame the trouble. He discussed bond additions to heaps, sea coal addititons, grain size of new sand for heap additions, lime in new sand, and moisture.—*Henry C. Winte, technical secretary.*

Pittsburgh

DEVIATING from the usual technical nature, the April meeting of the Pittsburgh Foundrymen's association was devoted to a discussion of training and instruction of foremen and workmen. Effects of a planned program on efficiency and foundry costs were outlined by Dr. Andrew Triche, University of Pittsburgh, who in addition to his academic work is engaged in vocational training work, conducting foremen classes for prominent industrial firms in this district.

Dr. Triche has done considerable work along this line with foundries, and following the talk he led an active discussion of the application of training principles to the program of the average foundry.

The nominating committee reported nominations for officers and executive committee for the fiscal year beginning July 1, 1939. The following nomination be voted on

(*Continued on page* 66)

MACKLIN
Grinding Wheels

Proven performance in foundries show the efficiency and economy of all types of Macklin Grinding Wheels. Manufactured in all kinds of grain and grade combinations Macklin Wheels are giving dependable service on all kinds of portable, floor stand and swing frame grinding. You too can "Protect Your Production" with Macklin Wheels.

A Macklin sales engineer will gladly give you experienced suggestions, without obligation.

MACKLIN COMPANY

Manufacturers of GRINDING WHEELS—JACKSON, MICHIGAN, U. S. A.

Distributors in all principal cities

***Sales Offices:*—Chicago - New York - Detroit - Pittsburgh - Cleveland - Cincinnati - Milwaukee - Philadelphia**

(*Continued from page* 64)

at the May meeting; President, J. H. Johnston, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.; vice-president, R. C. Heaslett, Continental Roll & Steel Foundry Co., Pittsburgh; secretary-treasurer, C. H. Paul, Mackintosh-Hemphill Co., Pittsburgh. For members of the executive committee the following were named: H. P. Spilker, Sterrit-Thomas Foundry Co.; T. A. Reynolds, McConway-Torley Corp.; H. M. Wilson, Taylor-Wilson Mfg. Co.; H. B. Reed, Westinghouse Air Brake Co.; and Leo Kelly, Fort Pitt Malleable Iron Co.—*R. L. Hartford.*

Ontario

MEETING of the Ontario chapter of the A. F. A. was held at Rock Garden lodge, Hamilton, Ont., March 17, with approximately 95 in attendance. The speaker was Fred J. Walls, International Nickel Co. Detroit. His broad contacts with the foundry industry have given him an excellent opportunity to observe significant trends which he interpreted in an instructive and interesting review.

The cupola remains the heart of the foundry and is the phase of foundry operation about which the least is known. Some trends in cupola design are illustrated by the development of balanced blast cupola, bottom tap cupola, and a cupola with two rows of tuyeres. Improvements in blowers and metering devices have contributed to better operation of the blast, with preheaters, and control of moisture in the blast subject to increasing attention. Importance of slags and their effect on properties of iron is now coming to the fore. Pressure gage is of utmost importance in telling what is going on within the cupola, and developments in recording pyrometers, usable in molten metal, appear promising. In the future, water cooling may permit operation of cupolas with little refractory material, water cooling of segments just above the tuyeres already having proved quite satisfactory in some installations.

Recently important advances have been made in treatment and handling of molten metal in the period between tapping and pouring. Use of mixing ladles has eliminated many variables from molten metal and has provided excellent opportunity for purifying treatments or addition of alloying materials. In the production foundry a monorail scale to hold the ladles enables the operator to pour in to the ladle just the amount of metal that is required for the casting.

Possibly the most outstanding development in casting of metal is the use of permanent molds for an increasing number of parts. Typical operations with permanent molds all parts are annealed because some come out exceptionally hard, but with automatic temperature control of the process, it may become possible to cast many parts without annealing subsequently. Progress may be made also in the use of metals of low thermal conductivity for the molds to reduce chilling. Some good physical properties of metal cast in permanent molds may be accounted for by the extra pressure placed on the iron as it starts to freeze in the rigid mold.

Certain properties of cast iron which have received little attention in recent years now are beginning to receive their due recognition. High compression strength and great vibration damping capacity, to mention only two, are properties of primary importance in many applications. Iron cast in permanent molds has less vibration damping capacity than sand castings. Ability of cast iron to damp vibration is important in such applications as heavy machine frames, and lack of this quality has mitigated against success of welded steel frames in some kinds of service.—*G. L. White*

Chicago

AT THE April meeting of the Chicago chapter, American Foundrymen's association, held April 10 at the Medinah Club, Chicago, Norton Co. presented a 20 minute moving picture in color showing the manufacture of abrasives. A. W. Gregg, Whiting Corp., discussed a visit to the Caterpillar Tractor works in Peoria by the apprentices.

The speaker of the evening was Prof. Russell J. Greenlee, chairman of the department of trades and industries, Purdue university, West Lafayette, Ind. Prof. Greenlee's subject was "Human Engineering," and he pointed out that in order to give the individual worker best working conditions possible it is necessary to know and understand him better. Business firms, he indicated, should have an open and friendly relationship with employes and instruct them on the details of operating the business.

The foreman has almost become a forgotten man in industry because more stress has been laid on the individual worker and little recognition of late has been given to the full value of the foreman.

The speaker outlined that industry today must consider unity of purpose, having a proper understanding of the individual worker to give him the right attitude toward his job; merit rating, to analyze a man to develop his abilities and give him proper recognition for them; job evaluation, the rating of each job so that the worker will know its value; and the training of foremen, so that the foreman is a leader and not a hard taskmaster.

At the May meeting of the chapter three speakers will be secured to discuss "Unusual Uses of Castings" in the steel, malleable iron and cast iron fields.—*J. F. Powell.*

Central New York

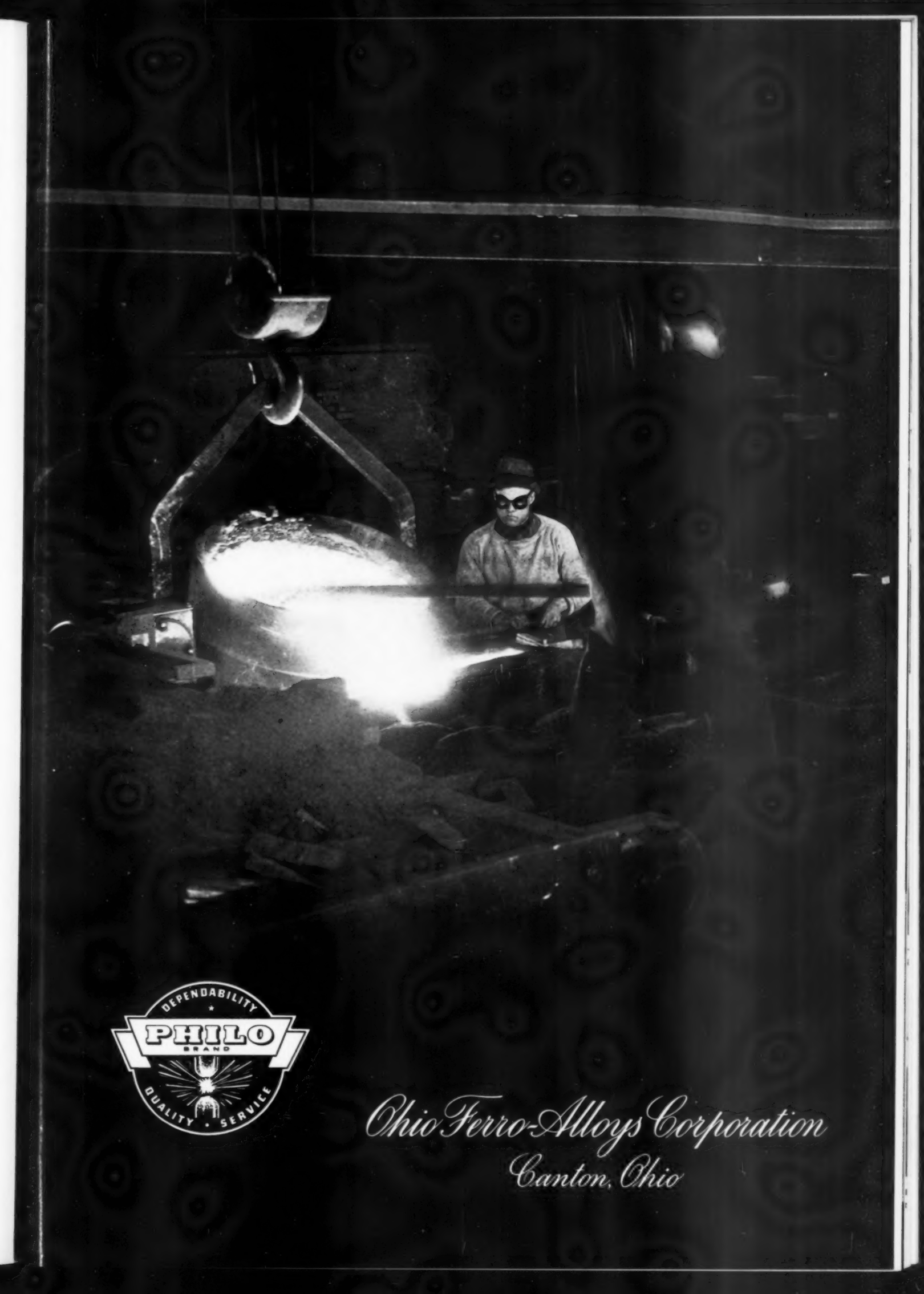
REGULAR monthly meeting of the Central New York chapter of the A. F. A. was held April 14 at the Onondaga hotel, Syracuse, N. Y. Dinner was served at 6:30 p. m. with 100 members and guests in attendance. Chairman H. H. Judson presided.

It was announced that a picnic or outing will be held in September. All foundrymen in the district will be invited. A committee, consisting of J. L. Lonergan, chairman; L. E. Hall, and J. J. Jardine was appointed to select the location for the outing. The chairman also appointed a nominating committee to present a slate of officers to be voted on at the next regular meeting, May 26.

Following this short business session, Robert Watson, Hanna Furnace Corp. was introduced as the speaker of the evening, taking as his subject "Coke and Modern Cupola Practice." Mr. Watson presented a verbal picture of the iron industry during the last 30 years and at times he related incidents that occurred prior to this period. He stated that in 1912 there were 200 blast furnace companies in America and that all of the material produced was consumed in the United States. During the period from 1922 until 1929 a great many changes were made in the iron and coke industry. About 1920 Henry Ford went into the iron business and it was here that borings were used in the blast furnace for the first time. The speaker explained that it was discovered that where two charges of borings followed eight charges of ore in the furnace, they were able to hold the silicon within ten points of the desired quantity.

After this period the metallurgist and foundrymen began working on carbon structure, analyzing for combined carbon and graphitic carbon. The speaker stated that no furnace can guarantee the total carbon in any iron. It is Mr. Watson's belief that good castings generally are produced where the carbons are divided in the proportion of 1/6

(*Continued on page* 68)


DEPENDABILITY
PHILO
BRAND
QUALITY • SERVICE
Ohio Ferro-Alloys Corporation
Canton, Ohio

(*Continued from page 66*)

combined carbon to 5/6 graphitic carbon. It has been his experience that this holds true throughout the foundry industry. The speaker also believes that we do not have carbon pick-up in the cupola from direct contact with the coke but that the carbon comes from the gases evolved, especially the monoxide gas.

Mr. Watson discussed at length the use of sized coke in the cupola and stated that it was his opinion that, where sized coke was used, it was also necessary to size the stock charged.

The speaker closed by explaining that the quality of the iron obtained at the spout is related to the method of charging the cupola. After the conclusion of Mr. Watson's talk, a great many questions were asked from the floor and a lively discussion ensued.—*L. D. Wright, secretary.*

Reading

MARCH meeting of the Reading Foundrymen's association, held at the Wyomissing club, Reading, Pa. on March 21 was one of the banner meetings of the year. Attendance was 68, representing foundry and allied industries. President Julian B. Greenstreet, foundry manager, Textile Machine Works, Reading, was the speaker of the evening. His subject was, "Making Light Gray Iron Castings and Selling Them at a Profit." There was a good deal of very interesting discussion during the question and answer period following the address, and everyone got a good deal out of this discussion.

The entertainment committee reported plans are under way for the annual picnic and golf tournament and there are many indications that this year's picnic and golf tournament is going to be bigger and better in every way. Four new members were welcomed into the association by President Greenstreet.—*H. C. Cummings, secretary.*

Conn. Nonferrous

APPROXIMATELY 42 members attended the regular meeting of the Connecticut Nonferrous Foundrymen's association held Tuesday, March 21 at Hotel Garde, New Haven, Conn. H. A. Phelps, Phelps Foundry Co., Ansonia, Conn., and president of the group presided at the meeting at which Byson Reid, Reading-Pratt & Cady division of the American Chain & Cable Co., Hartford, Conn. discussed "Foundry Costs." The topic provoked considerable discussion following the lecture.

The regular meeting night has been changed from the third Tuesday to the third Wednesday. Due to the fact that the A. F. A. convention falls in the week of the regular meeting in May, it was decided to hold that meeting on Wednesday, May 24. It will be held at the Indian Hill country club, New Britain, Conn. A golf tournament will be held in the afternoon with W. J. Kenney, North & Judd Mfg. Co., New Britain, Conn., in charge.—*Louis G. Tarantino, secretary.*

Wisconsin

APPROXIMATELY 75 members and guests attended the regular meeting of the Wisconsin chapter of the A. F. A. held at the Schroeder hotel, Milwaukee, March 17. Roy M. Jacobs, Standard Brass Works and chairman of the chapter presided. Ed Meyers reporting for the nominating committee named the following as nominees for office: President, W. J. MacNeill, Federal Malleable Co., Milwaukee; vice president, B. D. Claffey, General Malleable Corp., Waukesha, Wis.; secretary, A. C. Ziebell, Universal Foundry Co., Oshkosh, Wis.; treasurer, Milton Carpenter, Carpenter Bros., Milwaukee. Directors for 3 years, R. S. MacPherran, Allis-Chalmers Mfg. Co., Milwaukee; E. Ward, Badger Malleable & Mfg. Co., Milwaukee; director for 1 year, E. Roth, Motor Castings Co., Milwaukee.

R. C. Woodward, Bucyrus Erie Co., Milwaukee, discussed "Metallurgy of Heavy Machinery Castings." This talk was followed by moving pictures of machinery manufactured by Bucyrus Erie Co. in operation in many parts of the world. Phil Graw, radio commentator and analyst of Milwaukee spoke on "Co-operation in Organizations."—*B. D. Claffey, secretary.*

Southern California

GATES and Risers, (Iron castings), The Manufacture of Steel Castings, and a sound picture "Wheels across Africa" featured the March 23 dinner meeting of the Southern California chapter of the A.F.A. Following the dinner, which was attended by 84, J. G. Coffman, chairman, announced the program for the coming annual joint meeting with the Northern California chapter at Fresno, Calif. The program on April 22 includes in the afternoon a visit through the Twining Laboratories at Fresno. At the banquet in the evening to which the ladies are invited, Al Paul, manager, California Products Co. will speak on "Observations of Industrial Trends".

The technical program followed a splendid sound picture "Wheels across Africa" and a short musical treat featuring Miss Eliason, accordianist. James Wilkins, Mechanical Foundries, Inc., read a paper prepared by M. A. Scott, Greenlee Foundry Co., Chicago. It expounds the theory that by pouring through the riser directly in to the casting, that the sand between the riser and casting, becoming heated, helps the riser to remain liquid longer than the casting and by this means functions effectively in eliminating shrinkage. Following that theory Mr. Scott's foundry has been enabled to cut down on casting losses and greatly reduce the amount of metal in risers. A very interesting discussion concluded this controversial subject with opinion divided on the success of such operations on different types of iron.

E. C. Hummel, general manager, Utility Trailer Mfg. Co., foundry division, gave a talk on the manufacturing of steel castings. He showed special pictures of steel castings illustrating what can be done to a great advantage by the use of electric welding. This series of pictures was contributed by the Steel Founders' society.—*M. S. Robb, secretary.*

Northeastern Ohio

NEARLY 150 members and guests attended the annual "Alloys Night" meeting of the Northeastern Ohio chapter which was held at the Cleveland Athletic club, Cleveland, on April 13. Chairman L. P. Robinson presided and immediately following the dinner called upon Bertram G. Parker, Youngstown Foundry & Machine Co., Youngstown, O., and chairman of the nominating committee, for a report of his committee.

Mr. Parker announced that the following nominations had been made: For chairman—Ernest F. Hess, Ohio Injector Co., Wadsworth, O.; for vice chairman—F. Ray Fleig, Smith Facing & Supply Co., Cleveland; for secretary—J. H. Tressler, Hickman, Williams & Co., Cleveland, and for treasurer—R. F. Lincoln, Osborn Mfg. Co., Cleveland. For directors for three years—L. P. Robinson, Werner G. Smith Co., Cleveland; Fred A. Stewart, National Malleable & Steel Casting Co., Cleveland, and E. J. Hedlund, Urick Foundry Co., Erie, Pa. For director for one year—Frank L.

(*Concluded on page 71*)

(*Concluded from page* 68)

Barton, Fulton Foundry & Machine Co., Cleveland.

At the technical session which followed four speakers presented brief and pertinent facts on the use and application of chromium, molybdenum, nickel and vanadium. The speakers included R. C. Good, Electro Metallurgical Co., Pittsburgh; J. F. Robb, Climax Molybdenum Co., Pittsburgh; Fred J. Walls, International Nickel Co., Detroit, and R. G. McElwee, Vanadium Corp. of America, Detroit. All speakers stressed the point that alloying agents must be used with intelligence since they are not panaceas. For the best results with alloys from the viewpoint of favorable effects and economy, suitable base mixtures must be selected. The speakers also pointed out that alloys sometimes performed two functions, and the molten iron must be in the proper condition to obtain the desired effect. For example chromium and vanadium will act as deoxidizers in addition to their effect on carbon and iron which means that improper melting will give results which are not concordant.—*Edwin Bremer.*

Quad City

APRIL meeting of the Quad-City chapter of the A. F. A. was held at the LeClaire hotel, April 17, with 62 present. M. J. Gregory, chairman, opened the meeting and announced the May session of the chapter would be held May 22 at the Fort Armstrong hotel, Rock Island, Ill. Committees were appointed for annual picnic with J. H. Ploehn as chairman, the auditing committee, and annual regional meeting committee with P. T. Bancroft as chairman and C. F. Schorer, vice chairman. Report of the nominating committee was given by F. H. Kirby, recommending the following for officers and board of directors of the chapter: Horace Deane, Deere & Co., chairman; Herman Alex, Rock Island Arsenal, vice chairman; J. Morgan Johnson, secretary-treasurer; members of the board of directors: M. J. Gregory, P. T. Bancroft, L. W. Starner, Nathan Losser, L. E. Roby, E. C. Wussow, Ray Wendland, Frank W. Wells, and Earl Snoddy. M. J. Gregory also was nominated trustee for 3 years. Election of officers and board of directors will be held at the meeting May 22.

Carl Gamble, John Deere Spreader Works, Moline, Ill. gave the coffee talk on the stars, moon and sun, which proved to be of real interest to the group. Very clear examples and contrasts were made to make clear the size and distance of these bodies in relation to the earth.

The main speaker of the evening, C. O. Thieme, chief metallurgist, H. Kramer & Co., Chicago discussed "Nonferrous Foundry Practice." He told of the field of metallurgy at the present time as compared with the early days with its many varied divisions that needed to be considered in the metal industry. He then went into the nonferrous field and told of the gases and their effects on brass, aluminum and other metals. Melting practices and pouring temperatures were given a great deal of consideration by the speaker. The speaker discussed many alloys and their properties, and stressing a few in the field on nonferrous metals that have become very important due to tensile strength of the material. Many very interesting questions were asked which were answered by the speaker.—*J. Morgan Johnson, secretary-treasurer.*

New Jersey

APPLICATION of sandslinger equipment to jobbing work was discussed by W. F. Piper, vice president, Beardsley & Piper Co., Chicago, before the New Jersey Foundrymen's association, Newark, N. J., April 10. The sandslinger, he said, will ram a mold of any size and can be employed economically where the foundry is in position to plan its work sufficiently far ahead to keep the equipment busy. Approximately 75 were present.

Appointment of a nominating committee, headed by J. A. Williamson, Isbell-Porter Co., Newark, treasurer of the association was announced by G. W. Hanney, Barnett Foundry & Machine Co., Irvington, N. J., president.

Mr. Piper described the method of operating the equipment, stating that best results were obtained by keeping the head of sandslinger at least 18 inches above the mold and still higher if possible. No special types of flasks are necessary.

He showed motion pictures, with the equipment in operation, and later, following a general discussion, displayed color motion pictures not relating to the foundry, taken on a trip around the world. He confined these latter pictures to scenes taken in Australia and the Dutch East Indies. Several local foundrymen described their experiences with sandslinger equipment.—*B. K. Price.*

St. Louis

APPROXIMATELY 100 members and guests attended the April 13 meeting of the St. Louis District chapter of the A. F. A. held at the York hotel, St. Louis. Following the customary dinner session a coffee talk was given by J. Roy Stockton, sports writer of the *St. Louis Post-Dispatch.*

After a brief intermission the business session was opened by Acting Chairman L. E. Everett. Chairman of the entertainment committee, R. K. Durkan announced that the spring picnic would be held June 10 at Joe Davies' Country club and that a wide variety of entertainment would be offered. Thomas Ross spoke for the apprentice training committee and directed attention to competition in the molders contest as well as the pattern making contest.

A proposed constitutional amendment increasing the chapter board of directors from six to nine was given a first reading. Following this a nominating committee was appointed and instructed to submit its list of nominees for chapter officers during the year of 1939-1940.

The speaker of the evening was then introduced. Dr. A. B. Kuenzel, chief metallurgist of the Union Carbide & Carbon Research Laboratories Inc., presented a most interesting talk on alloys in iron and steel. An interesting round table discussion followed the talk.—*J. W. Kelin, secretary.*

Buffalo

MORE than 120 foundrymen attended the April 3 meeting of the Buffalo chapter held at Hotel Touraine, Buffalo. Four colored molders employed at Bingham & Taylor Foundry sang during dinner. R. K. Glass, treasurer introduced W. H. Woodall, who stated that the "Scoutorama" to be held week of April 20 will have a booth on foundries, as those boy scouts who earned merit badges on "Foundry" will attempt to illustrate their work. John McCallum volunteered assistance in nonferrous, Lynn Reynolds in gray iron, James P. Begley in steel and J. R. Turner on sands.

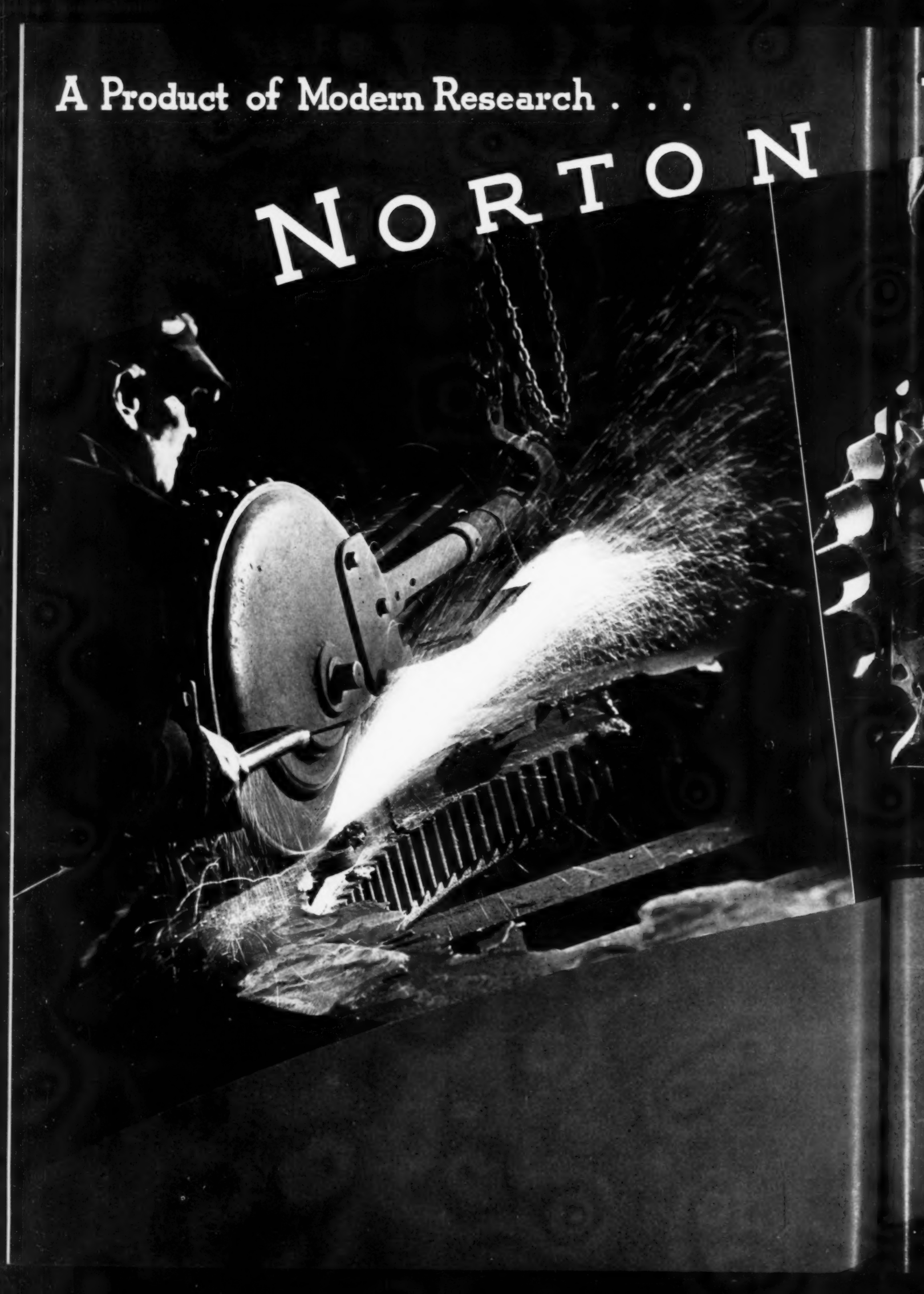
M. W. Pohlman, chairman of the chapter introduced Marshall Post, who spoke on "Castings by the Randupson Process" and showed slides and moving pictures to illustrate the highlights of that interesting process. Those present all agreed this was our best meeting and also the best attended. The officers and directors are gratified at the increasing number of foundrymen at each new meeting.—*J. R. Wark, secretary.*

Publish Bulletin

A recent bulletin issued by the Public Health service, treasury department, Washington, is entitled, "Selenium as a Potential Industrial Hazard." Copies of the bulletin may be obtained from the superintendent of documents, Washington, for 5 cents.

A Product of Modern Research . . .

NORTON



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THE resinoid bond formulae have been developed by the Norton research laboratories especially for high speed snagging wheels and the molding and curing operations are carried out under laboratory supervision with the most modern equipment obtainable. Control is the keynote—control of the abrasive, the bond and the manufacturing processes that unite them.

The result of this scientific control is definitely better snagging wheels—wheels that are cutting cleaning room costs for many foundries.

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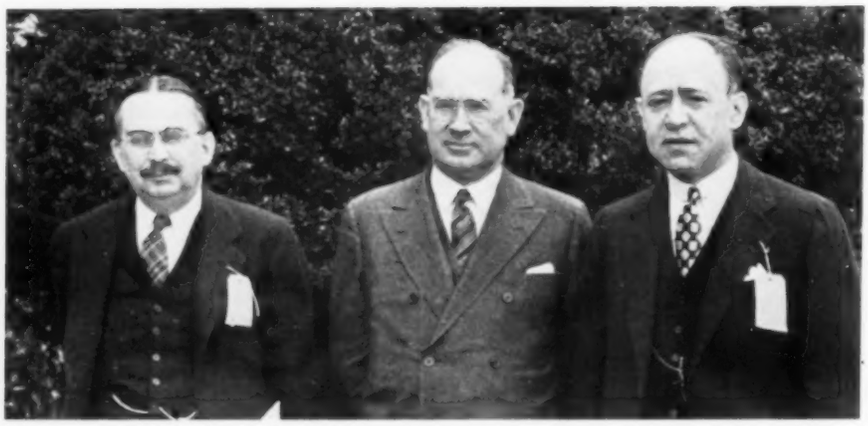
NORTON ABRASIVES



Left to right: John Howe Hall, consulting engineer, Philadelphia; Marshall Post, president, American Foundrymen's association, and vice president, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.; and Sam Tour, Lucius-Pitkin Inc., New York

Rutgers Regional Draws Crowd

THE foundry industry is beginning to fight back for its rightful share of tonnage, Marshall Post, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., and president, American Foundrymen's association, told casting makers at a regional meeting in New Brunswick, N. J. April 1. For example, he said, castings now are being used by the automotive industry in various ways not heretofore thought expedient.

Mr. Post said the Rutgers conference was prime evidence of the growing disposition of foundrymen to get together for exchange of ideas and for the general promotion of castings. Pointing to the broad scope of the industry in this country, he said there are 5800 foundries, employing 360,000 men, with an annual payroll of $450,000,000, and producing approximately 10,000,000 tons a year.

The conference was the first to be sponsored by the Philadelphia and Metropolitan New York-New Jersey chapters, of the national association, and was held in cooperation with the mechanical engineering department, Rutgers university. More than 200 attended.

Edwin C. Barringer, executive secretary, Institute of Scrap Iron and Steel, New York, presented the feature address at the dinner held at the Roger Smith hotel and presided over by Mr. Post. Mr. Barringer said that unfair implications have been read into the purchase of American pig iron, finished steel, scrap and rolling mill equipment by foreign nations.

"The assumption," he said, "that these metals are for war purposes entirely is an erroneous one, because abroad as at home, iron and steel, including of course castings, are inherently metals of peace and the vehicle of a high standard of living."

The conference included two technical sessions, held at the university gymnasium, in the morning and afternoon, respectively. At the first meeting, Norman L. Mochel, Westinghouse Electric & Mfg. Co., Philadelphia, discussed castings from the consumer's viewpoint, and J. C. Pendleton, Newport News Shipbuilding & Dry Dock Co., Newport News, Va., from the producer's viewpoint. John Howe Hall, consulting engineer, Philadelphia served as chairman.

At the second meeting, W. G. Reichert, Singer Mfg. Co., Elizabeth,

(Concluded on page 76)

Left—Reading left to right: W. A. Phair, The Iron Age, New York; Sam Tour, Lucius-Pitkin Inc., New York; Prof. W. C. Schulte, Rutgers University, New Brunswick, N. J.; R. J. Allen, Worthington Pump & Machine Corp., Harrison, N. J.; F. G. Sefing, International Nickel Co., Bayonne, N. J.; J. W. Reid, Robins Conveying Belt Co., Passaic, N. J.; W. E. Day Jr., Mack Mfg. Co., New Brunswick, N. J.; R. E. Nesbitt, Pratt Institute, Brooklyn; Samuel Frankel, H. Kramer & Co., New York; Don Reese, International Nickel Co., Bayonne, N. J.; and T. J. Wood, American Brake Shoe & Foundry Co., Mahwah, N. J. Right—Reading left to right: W. B. Coleman, W. B. Coleman & Co., Philadelphia; Marshall Post, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.; Dr. G. H. Clamer, Ajax Metal Co., Philadelphia; C. H. Newcomb, Rogers Brown-Lavino Co., Philadelphia; H. Reitinger, U. S. Pipe & Foundry Co., Burlington, N. J.; John H. S. Spencer, H. W. Butterworth & Sons, Bethayres, Pa.; Norman Mochel, Westinghouse Electric & Mfg. Co., Lester, Pa.; L. W. Harris, Link-Belt Co., Philadelphia; William C. Hartmann, Bethlehem Steel Co., Bethlehem, Pa.; Walter Yost, E. & G. Brooke Iron Co., Philadelphia, and John Howe Hall, Philadelphia

1874 SIXTY-FIVE YEARS OF SUPPLYING EQUIPMENT FOR EFFICIENT FOUNDRY OPERATION 1939

$34.00 **SLY PURAIR (SANDBLAST) HELMET**

Approved by

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PERMISSIBLE
SUPPLIED-AIR RESPIRATOR, TYPE CE

APPROVAL NO. 1911

ISSUED TO THE
W. W. SLY MANUFACTURING CO.
Cleveland, Ohio, U. S. A.

Approved for respiratory protection during abrasive blasting in any atmosphere not immediately harmful or from which the wearer can escape without the aid of the respirator. This approval applies only when the respirator is supplied through 15 to 50 feet of hose with respirable air within the pressure range of 3 to 9 pounds per square inch as specified by the manufacturer. Approved only when the assembly consists of respiratory inlet covering, (helmet) BM 1911, hose, BM 1911, and harness, BM 1911.

CAUTION

This respirator must not be worn in any atmosphere immediately dangerous to life.
Follow the manufacturer's instructions for providing a supply of respirable air, for installing, adjusting, using, cleaning, maintaining, and storing the device.

★ Meeting the Bureau of Mines specifications the Sly Purair Helmet for Sand Blast operators, consisting of helmet proper with a safety glass window, belt and air supply hose between the belt and helmet is priced to you at $34.00. The complete equipment consisting of a Sly Compressed Air Filter and Purifier, Air Pressure Gauge, Air Pressure Regulating Valve, 15 feet of $\frac{1}{2}$" I.D. x $\frac{5}{8}$" O.D. Special, non-kinking, non-collapsing, flexible air hose and fittings can *now* be shipped to you from stock for a total of only $50.50.

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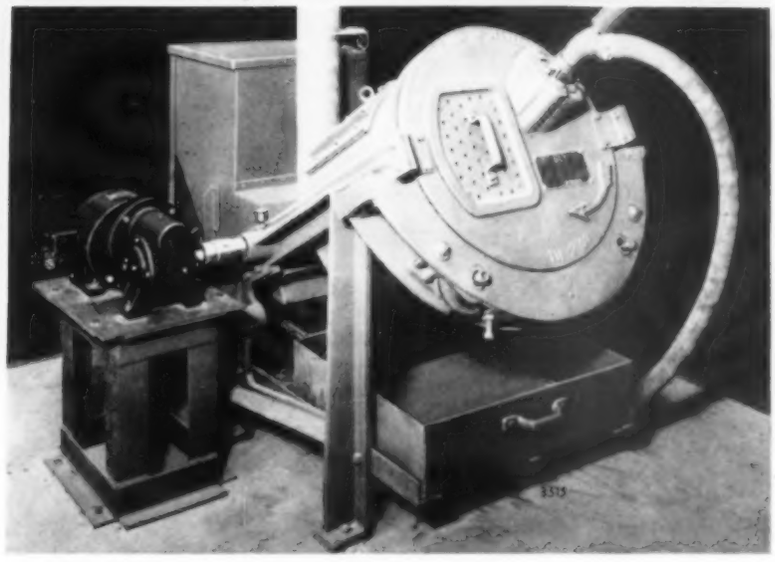

With the above Sly No. 4 Tilted Blast Mill the user thoroughly cleaned 150 pounds of brass castings in eight minutes.

Every foundry handling small castings, stampings, forgings, hardened steel parts, etc. needs this highly efficient mill.

It's a hog for work, a miser for maintenance. Has returned its investment two or three times over in a single year's operation.

Due to tilted position of barrel and convex perforated bottom, it does a thorough mixing job . . . turns work continually, bringing bottom pieces to top for close-range, powerful blast cleaning. Cleans with full effect of the direct blast as well as the rebounding abrasive particles.

Semi-automatic, this profit-producer needs very little attention and it's *not* expensive. Ask for bulletin S-82.

THE SLY PROFIT MAKING LINE

Complete Blast Room Installations, Large Blast Mills, Blast Cabinets of Various Types and Sizes, Tumbling Mills, Complete Dust Control Systems, Blast Cleaning Accessories, Sly Durablast Metal Abrasives.

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BLAST CLEANING EQUIPMENT · SLY · TUMBLING MILLS

DUST CONTROL EQUIPMENT FOR EVERY INDUSTRIAL PURPOSE

(*Concluded from page 74*)

N. J., spoke on "Casting Defects as Affected by Sand," and H. H. Judson, Goulds Pumps Inc., Seneca Falls, N. Y., on "Casting Defects as Affected by Gates and Risers," with Sam Tour, Lucius Pitkin Inc., New York, presiding. The meeting was promoted under the general direction of H. L. Henszey, Carborundum Co., Philadelphia, and Don J. Reese, International Nickel Co., Bayonne, N. J., as respective heads of the Philadelphia and New York-New Jersey chapters.

Discussing casting defects caused by sand, W. G. Reichert suggested the importance of investigating and classifying the cause of all complaints whether they be due to sand, metal, molding or to the gating arrangement; and of maintaining records of losses and correlating them with the test data, with responsibility for this work definitely centralized. Plotting of curves of permeability, strength and moisture against scrap losses caused by sand such as blows, drops, stickers, rough, and cuts, also prove valuable.

A sand with a suitable grain structure should be selected and then used as a base for the variables such as permeability, strength and the fines which accumulate in the heap. The importance of moisture in controlling the gas content of the mold and in reducing blows particularly was stressed.

Attacking the problem of mold hardness, Mr. Reichert stated that a soft mold, resulting in an overweight casting, swells, and strains may be caused by an increase in moisture or fineness of sand or a decrease of strength. On the other hand, a hard mold under standard ramming conditions may be caused by an increase in strength or a decrease in moisture and fineness and its most common defects are blows and scabs.

Effect of Sand Additions

Deformation, according to the speaker, is important as a controlling factor in regulating the green sand crush and in preventing drops if the flasks or the bars in the flask distort slightly under compression loads.

Slides were shown to illustrate the effect of grain distribution and to show the effect of fine and coarse additions to a standard sand. Very fine grains, it was indicated, often will cause a drop of 50 per cent in the permeability of the production heaps, while as much as 30 per cent of a coarse sand addition is necessary before the heaps show any increase in permeability. It was evidenced by this and other effects that a satisfactory grain structure and an open sand can be insured only by controlling the fines.

Practical methods also were discussed for removing the fines such as cyclone separation, air washing, exhausting the fines by a fan arrangement and by sieving them over a vibrating machine. Mr. Reichert showed the reaction of molding sands at elevated temperatures, particularly the effect of permeability, expansion and contraction and the effect of strength at high temperatures. A decrease of permeability at elevated temperatures, he said, is due to expansion of gases and to a lesser extent the gases arising from the combustion of carbonaceous materials contained in the molding sand. Expansion and contraction are important in so far as they are definitely found to be the gateway to the cause and remedy of cracks, buckling, rat-tails and scabs in the castings. Slides were shown illustrating these different defects and also just how the conditions could be remedied by the additions of molding materials.

The speaker stated that with the best type of sand for any given class of work it would produce poor results unless the gating design and the position of the runners were correct. Mr. Reichert stated, "that it is generally necessary either to standardize in the molding sand properties and vary the gating arrangement or standardize in the gating arrangement and vary the molding sand properties for best results." This is important particularly in recent years because of the more active participation of foundries in riser pouring or top pouring of castings.

Foundry Should Keep Records

A foundry should have a system of records, including sketches showing location of gates and risers, their size and so forth, and should be able to plot its sands and mixtures and keep close check on its scrap losses, according to H. H. Judson. Insofar as gating and feeding are concerned, such records serve only to establish generalities, which can be depended upon in limited degree.

Discussing operations at his own plant, the speaker said that when a new job comes in, he first runs a series of sample castings, breaks them open for study and then provides temporary gates, which if satisfactory are adopted.

Mr. Judson said he insisted upon uniformity of iron as to analysis and temperature, and had built his system on the pouring of metal hot. In gating all mounted jobs have runners in the cope for skimming purposes, and in-gates in the drag. In doing pressure work, he prefers several small gates to one large gate of the same capacity.

He discussed riser and venting problems at some length and commented on certain advantages of denseners, a term he preferred to that of chills, because chilling, he said, connotes a hardening, which the application of denseners does not imply. Under certain conditions, he stated, they can be used to eliminate risers. He added that niresist castings lend themselves readily to the use of denseners.

Close relationship between producer and buyer was stressed by Norman L. Mochel in outlining the consumer's viewpoint on castings. Each, he said, must first realize that the other must make a profit and then analyze their mutual problems in advance and keep in close touch during the production of the order.

Creating an "ideal" consumer for purposes of discussion, Mr. Mochel said the buyer expects a casting salesman to know his product, and is appreciative of visits of a high grade contact man, an executive preferably. The consumer, where possible, should have a foundry expert on his staff. The consumer, the speaker said, should report back promptly every defect showing up in a casting, with a sketch showing where the defect lies.

Consumer Should Do Welding

While admitting the idea was controversial, Mr. Mochel believed that the consumer should do whatever welding is necessary in the assembly of his product in his own shop, with the foundry sending the castings ready for welding. With the aid of lantern slides, he discussed work in his own shop, particularly with respect to welding and use of fabricated steel where the occasion arises. He thought that tests by gamma rays and x-rays were most useful, but "only as servants, not masters."

Use of fabricated metal is growing at the expense of castings, according to J. C. Pendleton, and it was his opinion that the No. 1 problem of foundrymen is to regain this lost ground. In some lines, foundrymen have apparently checked these inroads, but he believed the general record is still against them. Closer study of design, in co-operation with the consumer, was sorely needed, he said.

By use of lantern slides, he described various operations in his own shop, referring particularly to marine castings and pressure work, for which latter he prescribed the use of virgin metal in all cases. He thought the importance of radiography often was over emphasized by consumers, although he appreciated the importance of such tests under various circumstances.

Manning, Maxwell & Moore, Inc., Bridgeport, Conn., has appointed Ralph F. Heath sales representative in Houston and Jack Schuyler in the New Orleans territory.

Cost-reducing Equipment for Foundries

Cupolas (Hot or Cold Blast)
Cupola Chargers
Cupola Blowers
Brackelsberg Rotating Furnaces
Cradle Furnaces
Air Furnaces
Annealing Ovens
Steel Converters
Duplexing Equipment
Ladles — All Types
Tumbling Mills
Dust Filters
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Seacoal Pulverizers
Stokers (for Core Ovens)
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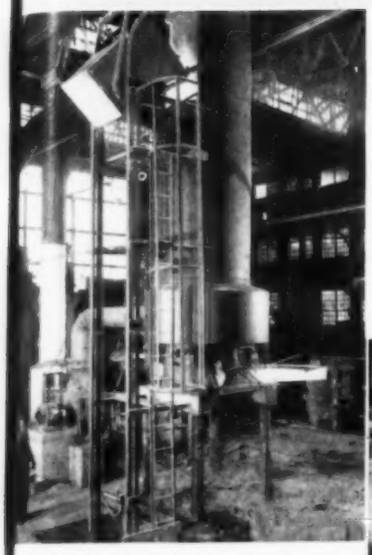
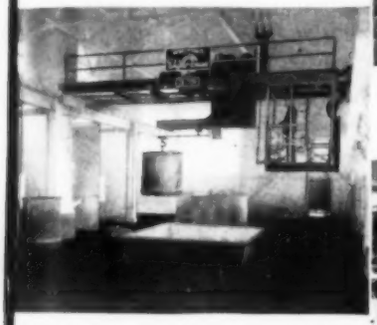
WHITING CORPORATION
HARVEY, ILLINOIS



The benefits of mechanical charging are now available to small foundries also, by the use of Whiting skip hoist chargers.



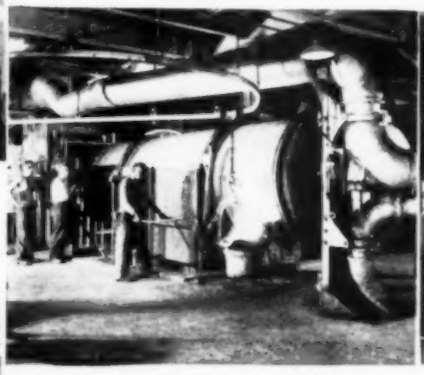
Reduced labor cost, better control, improved working conditions and lower cost metal—all the result of Wishbone charging.

Of prime importance in reducing cost of castings, is a Tiger yard crane for storing materials and making up charges.

A controlled, uniform supply of air as delivered by the Whiting blower is important to low-cost cupola operation.

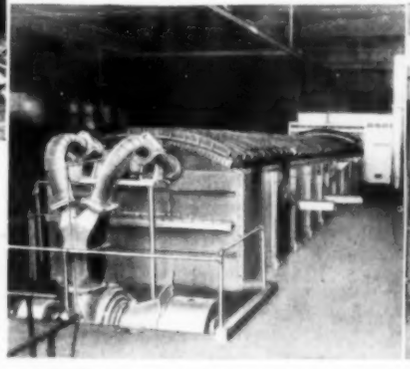
The Whiting Cupola—still the most economical iron melter. Hot blast offers additional economics.

Duplexing in various forms opens new doors of cost reduction.



Where high-test iron and special alloys are to be made at low cost, the rotary (Brack lsberg) furnace is the answer.

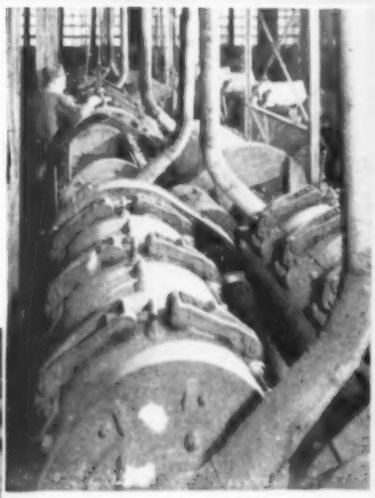
This new cradle furnace permits accurate control of analysis and Brinnel hardness, and rapid delivery of high temperature metal.



Because of big savings over all other forms of firing Whiting pulverized coal equipment is the leader on air furnaces.

Fuel ratios of 7 to 1 are regularly obtained with this p.c.-fired Whiting annealing oven.

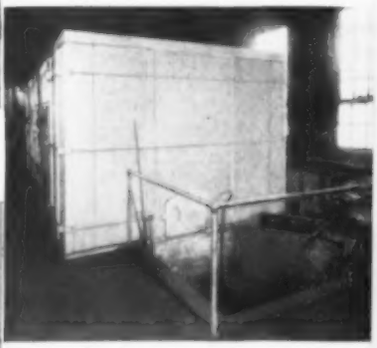
WHITING
PIONEERS SINCE 1884



Perfect cleaning action and low power consumption go hand in hand with Whiting roller bearing tumblers.

Effective dust removal with low maintenance expense is the keynote of Whiting cloth-tube dust filters.

Uniform, clean iron and continuous desulphurizing are obtained with this Whiting U-shaped ladle.



It costs much less to fire core ovens with coal via stoker, and results are superior

Hold Seventh Annual Regional At Michigan State

SEVENTH annual foundry conference at Lansing, Mich., under the joint auspices of the Detroit Chapter of the A. F. A., and the Mechanical Engineering department Michigan State college, was devoted exclusively to a consideration of "Castability of Metals." Factors which affect the casting of metals were considered under two headings (a) external influence and (b) internal reactions.

In absence of H. B. Dirks, dean of the school of engineering, Professor Miller introduced by Prof. Wayne Cockrell, welcomed the visitors, assured them that the college facilities were at the disposal of, and the personnel at all times were ready to co-operate with representatives of industry. He presented an interesting description of the history of the so called Land Grant colleges of which Michigan State college was the pioneer in 1855. Originally designed to promote agricultural subjects, the facilities of the college gradually were expanded to include mechanical engineering, liberal arts, home economics and other subjects. In addition to the parent institution at East Lansing, experimental and study stations are maintained at many centers throughout Michigan.

Consider Superheat Effect

Commencing at 9:30 a. m. Friday and continuing until 4:30 p. m., Saturday the closely packed program featured an array of interesting papers representing the theories, experiments and practical experience of men prominent in the foundry field. Limitation of space permits only a running comment.

At the first session under the chairmanship of Fred J. Walls, International Nickel Co., Detroit a paper on effect of superheat on castability and physical properties of gray iron, prepared jointly by N. A. Ziegler and H. W. Northrup, Crane Co., Chicago, was presented by Mr. Northrup. Basis of the paper was a series of experiments in which charges of gray iron scrap were melted in an induction type electric furnace. The carbon content of the metal in five typical heats was 3.25, 3.00, 2.75, 2.50 and 2.25 per cent. The metal was superheated to a temperature of 3000 degrees Fahr., and poured at varying temperatures. With the exception of instances where a low carbon content was desired for special purpose, it was claimed that the best physical properties are found in high carbon iron melted at high temperature. In the ensuing discussion a member claimed that the melting temperature was a relatively unimportant factor. Pouring temperature, character of mold, thickness of metal section controlled the formation of ferrite. Answering a question from the floor on the effect of nitrogen the speaker stated that up to the present experimentation had not been carried into the field a sufficient distance to warrant conclusions.

Reversed After Pouring

Discussing methods of controlling directional solidification of metals, Frederick A. Melmoth, Detroit Steel Castings Co., Detroit, claimed that the title covered a wide territory and applies from the point of view of design of the casting, heading and gating and possibly chilling technique. A general description of the theory underlying directional solidification as applied to steel ingots was illustrated by slides showing the theoretical lines of progressive solidification. Unfortunately comparatively few castings resemble ingots and as a result various conflicting factors must be taken into consideration. To overcome some of these factors the speaker showed slides illustrating methods of gating and heading castings. In some instances the final metal from the gate entered the mold through the riser, thereby supplying hot metal where it is needed most. In other instances where necessity dictates entrance of metal through a bottom gate, the mold is raised at one end after it is filled so that the riser is at the highest point and gravity assists the metal to feed downward.

In this connection he also pointed out that while a temperature gradient exists in the metal of the casting, it is probable that the effect of this is less significant than that the mold, due to the passage of the metal over it, has become highly heated locally at the spot where high temperature can do the most good by retarding solidification and enabling the metal to remain fluid for the longest possible time and thus achieve the greatest degree of feeding. Referring to the excessive amount of head metal considered necessary on many steel castings he showed a slide of a ring gear in which the reversal method of handling the mold after pouring reduced the number of heads from four to one. The proper angle of reversal from 10 degrees to 180 depends on local conditions and the study of many factors. A little experimentation usually supplies sufficient information to carry on the practice. No claim is made that the method is applicable or for that matter necessary on all types of castings. However, many castings can be improved by its adoption. The idea is not new. Over 20 years ago the speaker first saw it in use.

At the afternoon session under the chairmanship of Jesse L. Stoddard, Detroit Testing Laboratory, Detroit, a joint paper by H. L. Womochel and C. C. Sigerfoos, Michigan State college on the relation of sand characteristics to the shrinkage and cooling rates of gray iron castings was presented by Mr. Womochel. Work in connection with the preparation of the paper was carried out in the foundry and laboratory of the college. Through the aid of slides and charts the speaker explained the various experiments and effects on test bars poured in sands of varying degrees of permeability, moisture content and density of ramming.

Discuss Aluminum Practice

In a review of sand characteristics on alloying additions and melting practices on castability of aluminum alloys prepared by W. E. Sicha, and M. H. Gould, Aluminum Co. of America, Mr. Sicha directed attention to many of the variables in sand, melting and alloys peculiar to the aluminum foundry. He instanced many forms of defects and their causes. Differing widely from the sands used in iron and steel foundries, the sands in aluminum foundries are lower in strength, permeability and moisture content. A typical sand shows grain fineness from 1 to 3, clay content 15 to 35 per cent, permeability 4 to 12. The sand should be strong enough to prevent drops and erosion, but weak enough to facilitate contraction of the casting. The speaker went into considerable detail on the causes of defective castings, including sand and mold condition, interior and exterior chills, melting practice and the effect of holding the metal on the grain size. Replying to a question from the floor he

(*Concluded on page* 81)

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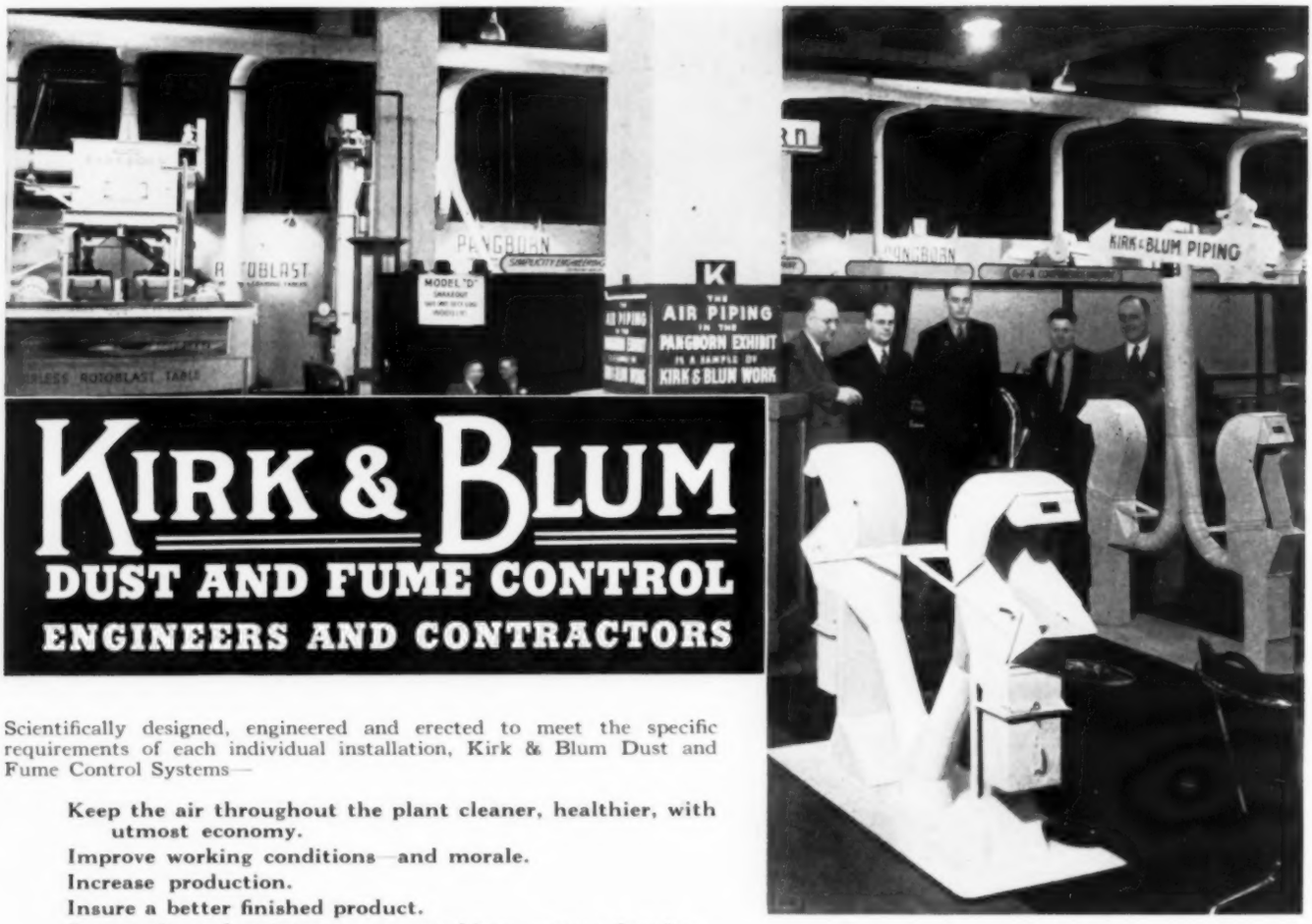

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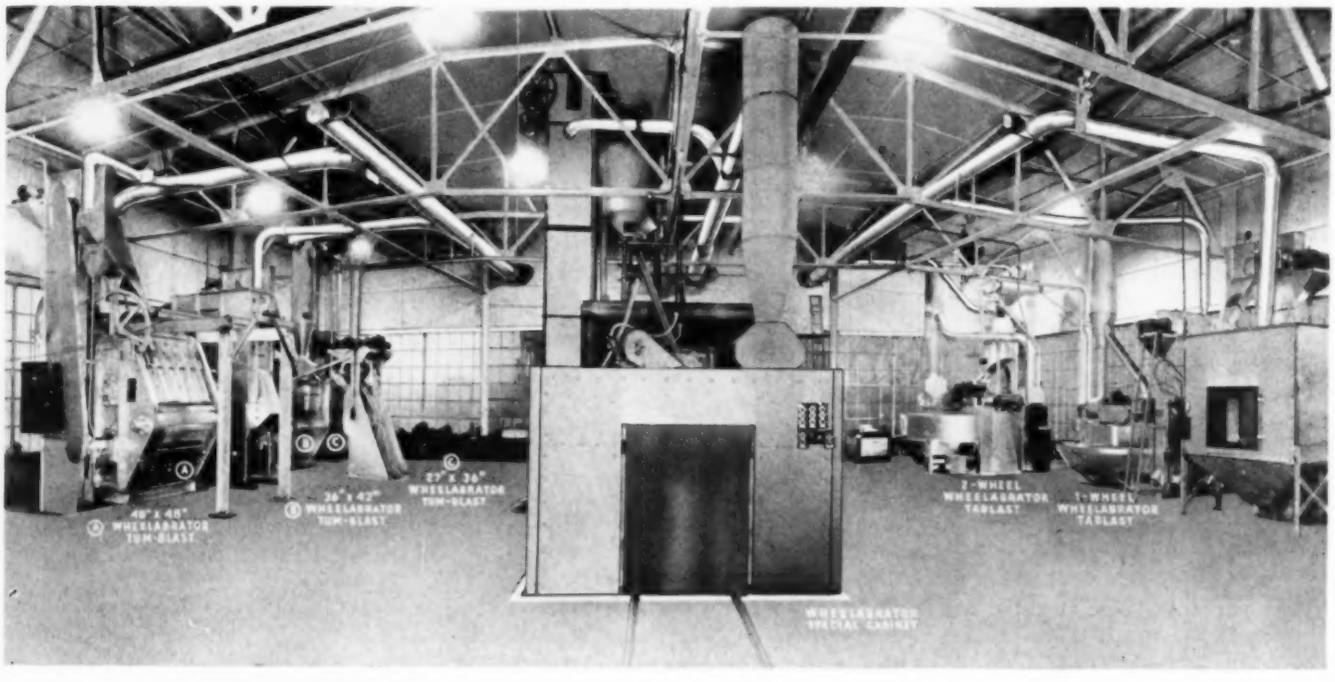
The Kirk & Blum exhibit at the 1938 A.F.A. Show, Cleveland. In the rear is shown a portion of the Kirk & Blum piping erected for one of the major exhibitors who had a large amount of equipment in operation. It is significant that this Kirk & Blum Piping System was preferred to all local and other installations.

●

(Below) Kirk & Blum Installation in the Demonstration Room of The American Foundry Equipment Company, Milwaukee.



(*Concluded from page* 78)

said that some investigation has been done on beryllium alloy additions but nothing is yet available for publication. In answer to another question he stated that the most satisfactory and widely used aluminum alloy for many purposes is the aluminum alloy containing 5 per cent silicon.

H. W. Dietert, Harry W. Dietert Co., Detroit, presented the results of a series of experiments designed to show how the condition of the sand in the mold affects the physical properties of the casting. Test bars 1.2-inch diameter were cast vertically in sections of 6-inch diameter pipe for tensile and transverse tests. Fluidity was measured on the standard A. F. A. spiral. Chill was determined on a step wedge cast vertically in open sand mold. Shrinkage was measured on a bar ½ x ½ x 12 inches cast between iron chill blocks. Porosity was observed in a cross with 5-inch arms and 1-inch cross sections in the arms.

Affects Physical Properties

Tests showed that the strength of the iron decreases with an increase of moisture in the sand. Test bars made in a dried mold, or in sand of very low moisture content cool the bar slowly and produce highest strength bars. The chill test showed that the depth of chill increased from 3½ to 4 steps as moisture increased from 0 to 7.5 moisture. Brinnel hardness of the cross showed an increase from 217 to 235 as the moisture in the sand was increased from 5.1 to 7.5 per cent. Increased moisture materially reduced fluidity of the metal.

Strength of the test bar decreased with an increase in permeability, indicating that as slow cooled cast metal is stronger than a fast cooled metal. Deflection decreased with increased permeability. Chill increased from 1¼ to 2 steps as permeability was increased from 25 to 170. Increased permeability reduced the fluidity. Porosity of the cross bar increased as the permeability decreased. Apparently high permeability has a chilling effect.

The first day concluded with a banquet in the Union building at which Pat Dwyer, engineering editor, THE FOUNDRY, acted as toastmaster. Entertainment was furnished by members of the music and dramatic departments of the college. Featured address of the evening, a highly interesting, instructive and scholarly dissertation on the part science plays in the administration of criminal justice was presented by M. C. Acers, assistant special agent Federal bureau of investigation.

V. A. Crosby Climax Molybdenum Co., Detroit, presided at the Saturday morning sessions devoted to consideration of internal reactions connected with the general subject of castability of metals. In a review of the factors affecting fluidity of metals, W. H. Spencer, Sealed Power Corp., Muskegon, Mich., followed a reference to definition of fluidity and test methods, by a description of the effect of moisture, permeability and hardness of the sand, mold facing, position and temperature of the mold. Under the head of general metal conditions he described viscosity, specific heat of the metal, density, latent heat of solidification, freezing temperature, solidification range, crystal form, films. He directed attention to the possibility of error in reading temperatures with the optical pyrometer, particularly where the surface of the metal is covered with oxide films.

Describing the effect of raw material characteristics on the castability of metal, John Lowe, Holly, Mich., claimed that the function of the cupola is to melt the iron charged and to superheat to such temperature that the metals of different analyses will mix properly, carry a minimum amount of slag, be consistent in analysis and meet the requirements of castable metal. He discussed cupola practice in extensive detail and elaborated on air supply, quality of coke size of charges, refractories, fluxes and the effect of various elements in small or large amount.

Affect Castability Slightly

In a short symposium on the effect of alloying elements, low, medium and high concentration effects were described by H. C. Aufderhaar, Electro Metallurgical Co., Chicago. Following an extended description of the various alloys and their applications and melting points, he claimed that in so far as low concentrations of alloys are concerned the effect on castability is slight. While there is little in the way of quantative tests to back this statement, it is well known that thousands of tons of low alloy cast iron are produced annually. Medium and high alloy irons generally require some changes in molding and pouring practice to obtain maximum castability.

R. J. Wilcox, Michigan Steel Casting Co., Detroit covered the castability of alloy steel castings under the following heads: Fluidity, character and degree of shrinkage and solidification, dissolved gases, capacity for and ease of degasification, susceptibility to cracking, effect on mold refractories. Ladle treatments by graphitizers and deoxidizers were described by R. G. McElwee, Vanadium Corp., Detroit. The conference closed with a demonstration of crystallization as influenced by contour, demonstration of polarized light to show stress concentration and demonstration of student operation of a foundry.

At a student lecture session Friday afternoon in the Physics building, metal castings in industry were described by three prominent foundrymen with Harry J. Deutsch, Aluminum Co., of America in the chair. Cast iron was handled by Frederick G. Sefing, International Nickel Co., New York, Nonferrous castings was covered by A. C. Wheat, Aluminum Co. of America. Frederick A. Melmoth, Detroit Steel Casting Co, Detroit covered the subject of steel castings

Book Review

Course of Foundry: Volume 3—Moulding Sand and Sand Preparation Plant, by Professor Kazimierz Gierdziejewski, Polytechnic Institute of Warsaw; 297 pages, 8¾ x 5¾ inches, 286 illustrations, black cloth cover.

This is the third volume of the *Course of Foundry* published by the author, who, apart from his many years' practical association with the foundry industry, has held the post of professor of foundry practice at the technical institute of Warsaw, to which is attached the foundry school founded by Professor Gierdziejewski.

This volume deals with molding sand and sand preparation plant used in a foundry, the contents of the book being as follows:

Chapter I: Generalities on molding sand—Constitution of molding sands—Molding sands and silica sands—Foundry sand testing—Bonds—Additional molding materials. Chapter II: Molding sand in the foundry and its control—Sand preparation—Relationship between the properties of molding sands and the physical properties of their constituents—Influence of the method of preparation of the sand on the properties of the molds and of the cores—Influence of the molding sand on the mechanical properties of the castings—Various molding mixtures used in the foundry. Chapter III: Use of molding materials in the foundry—Preparation of foundry sands for molds and cores—plant and equipment for the preparation of molding sands: Drying, crushing, sifting, mixing, aeration—Plant and equipment for the additional operations of sand preparation—Complex machines and plant for the preparation of foundry sand—Modern plant for sand preparation—Continuous sand preparation plant.

George F. Pettinos (Canada) Ltd., Hamilton, Ont., has been organized by George F. Pettinos Inc., Philadelphia. Charles E. Evans is manager of the new company doing business in Canada.

New England Foundrymen Hold Third Regional Meeting

THE third regional foundry conference at Cambridge, Mass., under the joint sponsorship of the New England Foundrymen's association, the American Foundrymen's association and the Massachusetts Institute of Technology, held in North Hall, Walker Memorial, April 14 and 15 was attended by approximately 350 engineers, metallurgists and foundrymen. The program included a discussion of personnel problems, application of spectroscopy to foundry problems, production of high test cast irons, blended sands, production of pressure resistant bronze castings, and variables in the core room.

Reviewed Personnel Problems

At the opening session J. Edwin Doyle, director division of unemployment compensation, commonwealth of Massachusetts and identified for many years with personnel work in the West Lynn works, General Electric Co., discussed personnel problems of the modern industrialist. He touched upon hiring methods, middle aged employes, contracts, selective competition, employe suggestion system, group activities, social trends, hurried and lopsided legislation. He severely scored many features of the present educational system.

For the detection of impurities in metals, substantial or even minute quantities of specific alloys, cast or machined, application of spectroscopy in foundry practice is increasing, according to Dr. George R. Harrison, professor of physics, Massachusetts Institute of Technology. The spectroscope is being used more by scrap dealers. Increasing content of copper and tin in open hearth steel with the melt of automobile scrap is evident. This is accumulative, more and more tin and copper finding its way into such scrap. Placing a sample of metal in a slit, through which an electric arc passes, a combination of prisms, microscope, lens and enlarged photographs constitute the essence of spectroscopy.

Speed with a reasonably accurate degree of analysis, brings out the advantages of spectroscopy, either through direct observation or through the use of spectrographs. The science is akin to radio inasmuch as atoms of various metals and elements under spectroscope probe throw definite light rays which easily can be classified as to presence and content. This in safety valves, to illustrate one product has resulted in the alloying of compensating metals of opposite characteristics in attaining a better product. Probably the most attractive attribute of the spectroscope at present is its availability for analysis of a sample of metal with rapidity and a determination of minute impurities in the same.

There are approximately 80 metallurgical installations in this country and even more in Europe. In the scrap trade 150 samples an hour as to alloy content are possible. A large midwest foundry makes periodic analysis of melts by the use of spectrographs, the time from inspection to finished print being but 9 minutes. Tests are taken hourly in a high production auto engine foundry. Reasonable control of chromium, copper, manganese, molybdenum, nickel and silicon is possible. A practical installation, satisfactory for the average foundry costs approximately $1500. While carbon and sulphur analysis can be made by spectroscopy, it appears uncertain as yet without vacuum methods. Gas atoms are somewhat difficult to determine, more so than metal, but progress in this direction is being made.

Develop Standard Specifications

J. S. Vanick, research metallurgist, International Nickel Co., New York claimed the steel metallurgist has contributed much to foundry practice in the development of high test cast iron. Development of standard specifications for such iron, which will give engineers confidence in the product for certain recognized properties and strength is still ahead. Commercial grades are produced showing tensile strength up to 60,000 pounds per square inch and in some instances higher. In the steel field, Mr. Vanick noted the possibility of increasing tensile strength of ordinary carbon steel to 125,000 pounds by manipulation of carbon, heat-treating, increasing the cooling rate, introduction of alloys or a combination of all.

The iron foundry in producing high test material, however, has the elimination of graphite to contend with. In general the methods of the steel foundry are available to the iron shop with the element of graphite involved. Practically all high test iron is processed or treated in a special way. Proper handling of the cupola makes it possible to reduce steel content in the charge. Production of high test iron with a tensile strength of 90,000 pounds per square inch is still largely in the academic stage as far as production in the cupola is concerned, although it may be secured readily in an air furnace. High test iron up to 50,000 pounds per square inch tensile strength is produced in volume in the cupola, and Mr. Vanick urged better control of raw materials in this practice. However, high strength irons are largely made in electric furnaces and confined mostly to comparatively small pieces.

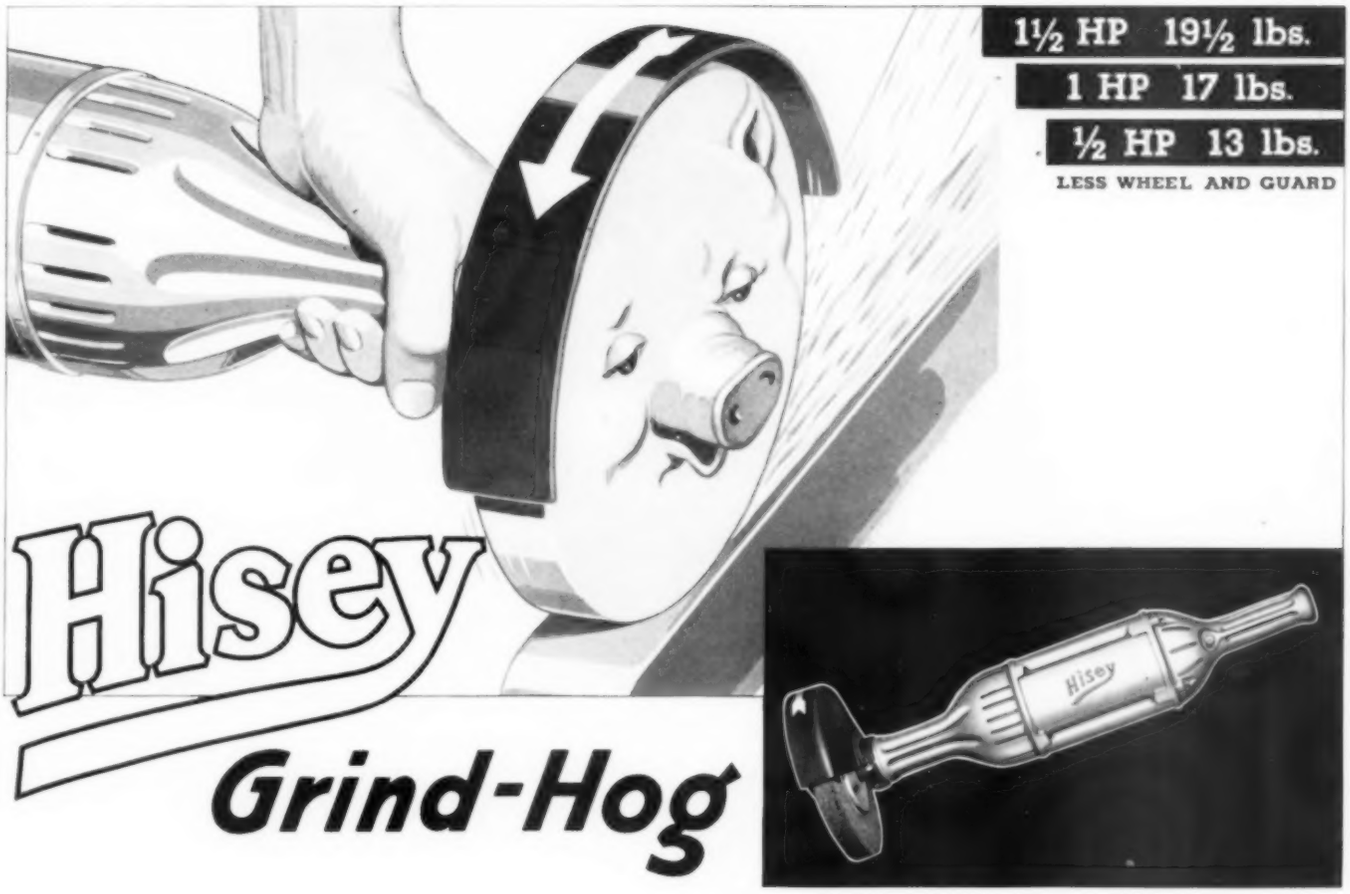
Large Foundries Have Advantage

Blending of sands for iron and steel castings was discussed at an open meeting under the leadership of D. L. Parker, General Electric Co., Lynn, Mass. While numerous suggestions as to procedure were offered, it was generally accepted that the larger production foundries with modern sand handling equipment were in a better position to blend than the average smaller foundry.

Control of all factors in foundry practice was urged by D. Frank O'Connor, foreman, brass foundry, Walworth Co., South Boston, Mass., in reviewing production of pressure bronze castings. Customers in the refining field have raised standards. He displayed a series of group and intricate castings, the production of which centers largely on control of all factors in operation, from design to machining. He stressed the importance of atmospheric conditions in foundry practice, notably in core work with machine molding. In the production of intricate bronze parts cores are baked slowly at approximately 450 degrees Fahr.

Open flame and crucible furnaces are used with 700 to 1000 pounds of material per charge. A 150-pound preheated steel ladle is used in pouring. Temperature of the metal depends on the size of casting, and the alloy involved. The usual range is from 2150 to 2300 degrees Fahr. for small and medium-sized work. Larger castings are poured at lower temperatures, but not under 2100

(*Concluded on page* 84)



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Just consider what that means—a 1/2 H. P. Electric Grinder weighing only 13 pounds. That gives you the advantages of high frequency and air operated tools without the disadvantages. The "HISEY" Grind-Hog operates directly from standard 220 Volt, 3 phase, 60 cycle Alternating Current power outlets.

This means a big saving in actual current consumption and eliminates entirely the expensive operating and maintenance costs of air compressors or frequency changers.

This also means that the Grind-Hog can be operated anywhere in the plant as it does not require any special piping or wiring.

Unlike other types of Grinders, the "HISEY" Grind-Hog operates at practically constant speed from no load to full load.

New Motor Principal Involved

The half horsepower Grind-Hog weighing 13 pounds compares with about 35 pounds for former electric grinders. The bulk of this reduction is made possible by the extreme light weight motor. Altho the motor weight has been cut more than in half, the efficiency remains the same.

Surprisingly, the construction is also much simpler and longer life can be expected. It is of two-pole polyphase design without any brushes, commutator, moving wires or centrifugal switch. Several patents and trade secrets are involved.

Motor Totally Enclosed

The Motor is totally enclosed, dust-proof—splash-proof—drip-proof. There are no air cleaners or filters to change or become clogged. The Motor housing and all other castings are of special high tensile aluminum alloy, with steel inserts forming the bearing seats.

Only One Moving Part

There is only one moving part—the spindle and rotor assembly. This is mounted on two double row ball bearings easily accessible yet completely protected from grit and dirt.

Convince Yourself

As this is an entirely new development—so radically different—we are prepared to offer convincing proof—we will ship machine for test under actual service conditions to any responsible company.

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Electric **DRILLS . . . GRINDERS . . . BUFFERS**

(*Concluded from page 82*)

degrees. All castings are tested under 80 pounds air pressure under water. Preheating of the pouring ladle to an approximate temperature of the metal is advocated, the pouring temperature of the metal being taken at the floor, rather than at the furnace.

Molding sand also is moderately preheated to 60 to 90 degrees. Moisture of sand is held from 4½ to 5 per cent. With strict control in all departments it is possible to trace porosity in any casting to the faulty point in operation under the system in which the Walworth foundry operates. In the matter of design the speaker suggested that the foundryman be called into consultation with the engineer, designer and patternmaker. In the production of intricate bronze fittings a sand of 150 to 180 grain size is used.

Sand is the reason for many variables in coreroom experience in the opinion of L. P. Robinson, director of core oil sales, Werner G. Smith Co., Cleveland. He illustrated his talk with concrete examples of malpractice in sand control and use, indicating a saving of $150 a month at one foundry in fuel as the result of the employment of high grade sand for specific work. Uniform quality of sand moisture and oil content eliminate variables in core work. Known and successful mixture procedure should be posted and followed closely. In mechanical mixing by mullers or paddling the time element is important. He stated that a great deal of sand is over-mulled. This may, and probably in many instances does reduce the tensile strength of the mixture. Three to four minutes is enough on numerous types of core work with automatic control desirable in all instances.

One of the worst variables in the core room is moisture control traceable in many instances to outside storage of sand. Mr. Robinson favors equipment to insure dry sand for uniformity and control in core making; also closer control of core baking, including more frequent cleaning of flues. Few foundries, he contends, have enough core baking facilities or capacity, resulting in rushing core treatment and frequently burned stock as a result. Higher temperatures at pouring with higher steel content has resulted in some problems in gray iron foundries, he noted. Assuming dry sand is used, Mr. Robinson favors, in mixing, binder first; water second and oil last.

Reader's Comment

EDITOR'S NOTE — *Material Appearing Under this Head Does Not Necessarily Reflect the Opinion of The Foundry or of Its Editors.*

High Sulphur

TO THE EDITOR:

Some time ago normal operation was interrupted temporarily by the appearance of hard castings on five floors. Castings on all the other floors poured from a 100-ton heat showed no deviation from standard. Analysis of the hard castings showed an abnormally high sulphur content, 0.217 per cent, even after going through a desulphurization process in the mixing ladle at the furnace spout. After checking all operations and making a visual inspection of the scrap piles we had a man break all unusual or suspicious pieces of scrap. We came across several pieces which looked like pig metal that came from the bottom of a dismantled blast furnace. Analysis of two pieces showed a sulphur content of 1.93 per cent in one and 0.73 per cent in the other. The pieces were traced back to a certain carload of scrap. By hunting through the remainder of this carload and having a man watch the entire procedure we found approximately 1500 pounds of similar material. This was segregated from the remainder and we have had no further trouble. We are passing this information along in the belief that it may be of some benefit to others, either in watching closely for dangerous material, or where trouble already exists may furnish a lead in finding the cause.

C. L. WILLIAMS

National Radiator Corp.
Johnstown, Pa.

Book Review

Industrial Price Policies and Economic Progress, by Edwin G. Nourse and Horace B. Drury, 314 pages, published by the Brookings Institution and supplied by THE FOUNDRY, Cleveland, for $2.50 and in Europe by the Penton Publishing Co., Ltd., London.

The authors of this study emphasize the need for business executives applying all their ingenuity and experience toward producing more goods at lower prices so that mass consumption may make it possible to attain full economies of mass production.

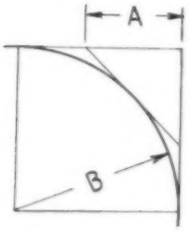
Demand for increased government responsibility for providing employment for the nation's millions of unemployed can be diminished only if employment is provided by private industry. Business obviously cannot afford to go out and hire men unneeded. But numerous industries have contributed much in reducing prices, expanding output, and raising the existence level of the people as a whole. Such policies create jobs. The book proceeds from the general analysis developed in a former Brookings Institution publication, *Income and Economic Progress*.

Develops Chart For Foundry Chamfer

By Ralph W. Schowalter

The accompanying chart will be found to be very convenient for patternmakers in figuring the proper chamfer on rounded corners. Majority of patternmakers always make a layout to get the measurement for rounding a corner. No two of these men would have the same measurement if held to 1/64-inch, because it is difficult to determine the exact intersection of the 45 degree and the tangent line. Distance A for any corner is found by multiplying radius *B* by 0.58577. The accompanying chart shows the length of line *A* for practically all radii between 1/16 and 3 inches.

CHART FOR CHAMFER FOR ROUNDING CORNERS



B	A	B	A
1/16	= .0366	1 - 9/16	= .9152
1/8	= .0732	1 - 5/8	= .9518
3/16	= .1098	1 - 11/16	= .9884
1/4	= .1464	1 - 3/4	= 1.0251
5/16	= .1830	1 - 13/16	= 1.0617
3/8	= .2196	1 - 7/8	= 1.0983
7/16	= .2562	1 - 15/16	= 1.1349
1/2	= .2928	2	= 1.1715
9/16	= .3294	2 - 1/16	= 1.2081
5/8	= .3661	2 - 1/8	= 1.2447
11/16	= .4027	2 - 3/16	= 1.2813
3/4	= .4393	2 - 1/4	= 1.3179
13/16	= .4759	2 - 5/16	= 1.3546
7/8	= .5125	2 - 3/8	= 1.3912
15/16	= .5491	2 - 7/16	= 1.4278
1	= .5857	2 - 1/2	= 1.4644
1 - 1/16	= .6223	2 - 9/16	= 1.5010
1 - 1/8	= .6589	2 - 5/8	= 1.5376
1 - 3/16	= .6956	2 - 11/16	= 1.5742
1 - 1/4	= .7322	2 - 3/4	= 1.6108
1 - 5/16	= .7688	2 - 13/16	= 1.6474
1 - 3/8	= .8054	2 - 7/8	= 1.6841
1 - 7/16	= .8420	2 - 15/16	= 1.7207
1 - 1/2	= .8786	3	= 1.7573

To find A for any other radius multiply 0.58577 x Radius

For Foundrymen...a New Bond Clay

THE STRONGEST BOND CLAY OF ANY TYPE EVER OFFERED AMERICAN FOUNDRYMEN

HIGHEST GREEN STRENGTH • MODERATE DRY STRENGTH • HIGHER PERMEABILITY • NO LOSS OF LUMPY SAND • LESS TEMPERING WATER • NO CRACKED CASTINGS • HIGH SINTERING POINT • LOWER CLEANING COSTS • HIGHER FLOWABILITY • EASY SHAKEOUT • FINE FINISH

Here is a NEW clay bond which is truly revolutionary in that, among other things, it develops *tremendous green strength* combined with another most desirable quality . . . *moderate dry strength.*

For example, a typical and impartial test recently showed:

	Green Compression Strength	Green Permeability	Dry Compression Strength
95% silica sand 5% bentonite	6.10	169	57.3
95% silica sand 5% DIXIE BOND	9.99	179	34.7

MODERATE DRY STRENGTH MEANS less danger of cracked castings, no difficulty and costly shakeout, no abuse of flasks, no hard, lumpy sand at the shakeout, no loss of hard baked lumps.

IN YOUR FOUNDRY, Dixie Bond will give a beautiful finish, lower sand loss, low sand cost, and greater safety.

USERS TELL US:

"Finest finish we have ever had on our castings."

" . . . . production stepped up 15%."

"Sand cleans better from corners and we have eliminated one grinding operation."

"Our permeability is up about 18%."

"We now haul out 1½ loads of sand lumps a day compared to 15 loads a day formerly."

We invite foundrymen to write us for samples and more complete information.

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Gray Iron Properties Improve

(*Continued from page* 42)

elements will be found in the bibliography. It is interesting to note the references to work on arsenic and lead as well as to the more usual alloy additions. As far as has been determined both arsenic and lead additions are detrimental to the properties of ordinary cast irons.

The evaluation of modern cast irons often involves the consideration of other properties than those readily determined by the standardized mechanical tests and reported numerically as tensile strength, transverse strength or brinell hardness. Toughness as determined by impact tests, the corrosion and wear resistance and the behavior of the material in service at elevated temperatures or when welded are of increasing importance.

Several important articles on the corrosion resistance of cast iron have appeared in the past year. Roll[27] has published an extended review of the literature and Piwowarsky[28] has discussed the effects of corrosion by chemical attack on the engineering properties of plain cast iron. This later work indicates that immersion in various mildly corrosive media, such as 1 per cent sodium chloride solution, for short periods of time does not effect the static strength of cast iron materially.

(*Concluded on page* 89)

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(*Concluded from page* 86)

Hudson[29] has given a rather complete account of the highly alloyed irons, containing 13-18 per cent silicon; or 13-16 per cent nickel and 6-8 per cent copper; or 25-30 per cent chromium, used for special applications where resistance to chemical attack is of primary importance. The results of a serious of laboratory tests comparing the corrosion resistance of plain cast iron with that of some of the special alloys are given in tabulated form. These data should serve as a guide in the selection of special cast irons for corrosive service but it must be remembered that the conditions of a laboratory test must closely represent actual service conditions to avoid misleading conclusions.

References to recent work on the testing of cast iron and to its less commonly measured engineering properties are given by title in the bibliography. Leonard[61] has published an excellent summary of the specifications set up by the engineering bodies in the various countries. Dimensional illustrations of various standard test bars and a discussion of test methods are given.

Detroit Foundries

(*Continued from page* 43)

overhead conveyor which moves them into a specially built gas heated oven for controlled cooling. Events leading to the introduction of this cooling system were outlined in THE FOUNDRY for March in connection with a report of a paper presented before Detroit foundrymen by L. A. Danse.

About six hours elapse between pouring the block and arrival at the end of the inspection line. The bulk of this period is accounted for by passage through the cooling oven. After they are cooled, the blocks travel through the usual series of shotblasting, grinding and inspection operations, following which they are trucked to the adjacent machining division.

Equipment has been laid out for practically a straight line flow of parts through pouring, shakeout, cooling, cleaning and inspection operations. New equipment to be installed this summer will facilitate further this uninterrupted flow of product through the foundry, and also will provide extensive improvement to sand handling and molding operations.

Foundry Is Air Conditioned

The entire foundry is air conditioned by a wet type dust collection system. Exhaust outlets are located at strategic points. Drawing dust laden air to a central washing station removes all particles of dust and grit. Resultant sludge is pumped to two outside settling tanks. When one tank has been filled, the water is drained off and the settled material removed with crane and grab bucket to adjacent railroad cars.

Outside storage space is available for several thousand tons of pig iron, scrap, and other materials used in cupola charging. Gates and risers are trucked from inside the plant, dumped and then transferred to storage bins by an overhead crane with magnet. The same crane, traveling on a 70-foot runway, is used to load bottom drop charging buckets which are moved to the weighing station and into cupolas with electric trucks.

Steelwork has been let for a 3-story addition for the Ford foundry, part of an expansion program reported to run over $2,000,000. The height of this addition is required for hoppers in a new sand handling system, a part of the expansion program. Other phases include the erection of two new forehearth cupolas, installation of five new electric furnaces, 10 tons and under in capacity, and a dust collection system.

Apparently the preliminary experimental work with the rebuilt Marks cupola, outlined in this department for September, 1938, has been concluded successfully and production units can now be started. Evidently it is the intention to melt in the forehearth cupolas and then superheat the iron in the small electric furnaces.

According to one source, the expansion program has been marked rush and is slated to be in operation about June 15. As yet it is not known definitely how much of the additional facilities will be required for production of tractor parts, but it is known that development work on the tractor is being pushed also, so it may be the two programs go somewhat hand in hand.

By the time this appears in print, initial assemblies of the midget car to be built by Crosley Mfg. Co. will have come off the line scheduled to start May 1. Activity on this small car, to sell at around $350, was suspended for several months at the end of last year, but this year was reawakened, and assemblies at Richmond, Ind., should now be in

process. Engine is of the 2-cylinder type, supplied by Waukesha Engine Co. Body and frame are being built by Murray Corp., Detroit. Wheels will be fabricated by Motor Wheel Corp. in Lansing, Mich.

A fair amount of activity has developed in the pouring of body dies for 1940 models. Several producers have releases on parts of these programs. Actual construction of the dies themselves has been slow. Chrysler Corp. divisions intend to push 1939 model production just as long as retail demand holds and at present have released material and parts into June. It likely will be Sept. 15 before any line production of 1940 models is started. Buick and Packard may be ready with new models in July, but lately there has been less disposition to hurry the 1940 models, except for the usual pressure on engineering and planning departments.

A.F.A. Awards Three Gold Medals

(*Concluded from page* 35)

past chairman of the joint committee on foundry refractories which promoted surveys of refractories for uses in the various branches of the industry, and was a member of the joint committee on survey of electric power costs in the foundry.

Donald J. Campbell has been president of the Campbell, Wyant & Cannon Foundry Co. since its incorporation in 1908 when he, together with Ira A. Wyant now secretary and treasurer and George W. Cannon, now vice president and general manager in charge of production all practical molders from Chicago, organized the company which from its first day's production of 5 tons has grown to one which during the rush period of 1929 turned out 550 tons a day. The original force comprised of the three partners has grown to one of a maximum of 2500 men.

Back in 1905 these three foundrymen, all working in Chicago, met for the first time. They were ambitious and each shared the other's desire to own a foundry and try their ideas for improving production methods then in vogue. They formed a partnership and their passion for experimentation has led to their developing many processes especially as related to motor car castings. In 1931 their first electric furnace was installed for the manufacture of special alloy castings, chiefly brake drums. They developed a process for interlining cast iron drums with sheet steel by fusing the two metals, producing an ideal braking surface. A new plant designed particularly for brake drum production was built at Lansing as a joint undertaking with the Motor Wheel Corp. of that city.

Electric furnace production was extended after 1931 to embrace the manufacture of camshafts, crank shafts and alloyed cast brake drums and hubs in combination as one casting. Their production also embraces a large department for interlining sleeves for cylinders. This foundry was the first to produce a V-8 motor block and crank case in a single cast, a product which has since been adopted by several large automotive manufacturers. From the beginning the company has maintained a research department, and this has led to pioneering work in the use of the spectrograph for chemical analysis of iron. With this process analysis of metal in the furnaces can be made before it is poured into molds.

Throughout their association these three men have maintained their broad vision of new methods and through their division of responsibilities have built up a personnel and an organization leading in the foundry field. With Mr. Campbell as president in charge of development and special processes, Mr. Wyant as secretary and treasurer, has charge of sales and metallurgy, while Mr. Cannon is vice president and general manager in charge of production. Associated with them are many men whom they have gathered around them to aid in production and development methods, whose able assistance is acknowledged freely by Messrs. Campbell, Wyant and Cannon.

Holds Many Patents

Donald James Campbell is a Canadian by birth and the third generation of craftsmen devoted by family tradition to iron founding. At an early age he was an apprentice in a foundry and came up through the ranks of journeymen to the position he now occupies as chief executive of one of the largest foundries in the world. His furtherance of the foundry art is marked by over 150 patents embracing both equipment and processes, relating largely to the automotive industry.

Mr. Falk not only has made the training program in his plant one of the best in a state noted for its training efforts but has been a leader over the years in this work by presenting numerous addresses before national associations, showing the economic and humanitarian advantages and possibilities of having organized training programs in industrial plants.

Harold S. Falk received his technical training in the engineering school of the University of Wisconsin, graduating in 1906 with a bachelor of science degree. While in college he spent his summer vacations at the Falk Corp. as a foundry helper, then at molding, machinist work, pattern work, open-hearth helper, in the laboratory, and other shop positions. After graduation he joined the Falk organization first serving in the maintenance department, and successively, as assistant to the foundry superintendent, as assistant foundry superintendent and then as superintendent.

About 1914 Mr. Falk became general superintendent of the entire plant, serving in that capacity until 1922, when he was made vice president and works manager, having been elected to the board of directors in 1918. Mr. Falk early became interested in apprentice training and in promoting this cause in industry. In recognition of this work he was, several years ago, granted an honorary degree of master of science at Marquette university.

Mr. Falk has been an active worker in trade and technical association activities, having served on the board of directors of the American Foundrymen's association and on various boards and committees of the National Founders' association, Steel Founders' Society of America, the American Society of Mechanical Engineers and many other associations.

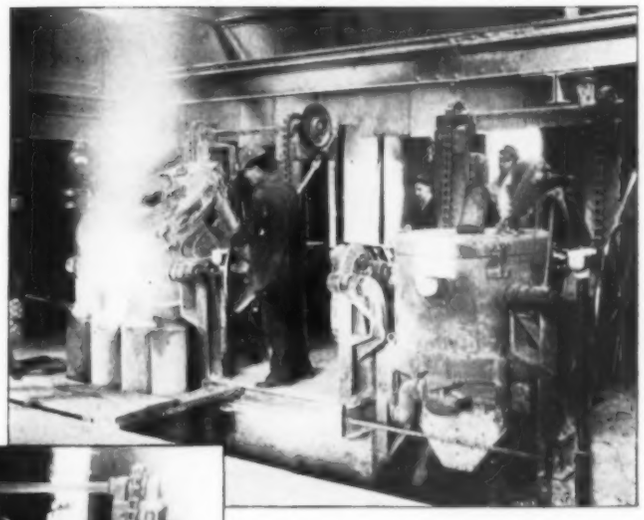
Book Review

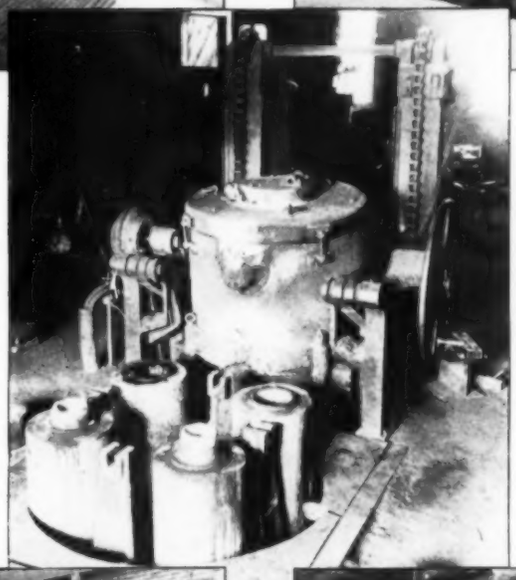
Metallurgy, by Carl G. Johnson, R. S. Dean, and J. L. Gregg, cloth, 150 pages, published by the American Technical society, Chicago, and supplied by THE FOUNDRY, Cleveland, for $1.50, and in Europe by the Penton Publishing Co. Ltd., London.

This book has been planned to serve as an introduction to the science of metallurgy. It presents in a simple way some of the knowledge that is available concerning the manufacture and behavior of the many metals and alloys used by our modern civilization. Because the book is designed for the use of engineering students, the science of physical metallurgy has been stressed rather than that of chemical metallurgy. It contains a number of simple definitions of properties and tests, and includes a helpful list of literature on metallurgical subjects.

Stearns Magnetic Mfg. Co., Milwaukee, manufacturers of magnetic separators and magnetic friction devices, announces the appointment of W. E. Craner as its representative in Houston, Tex.

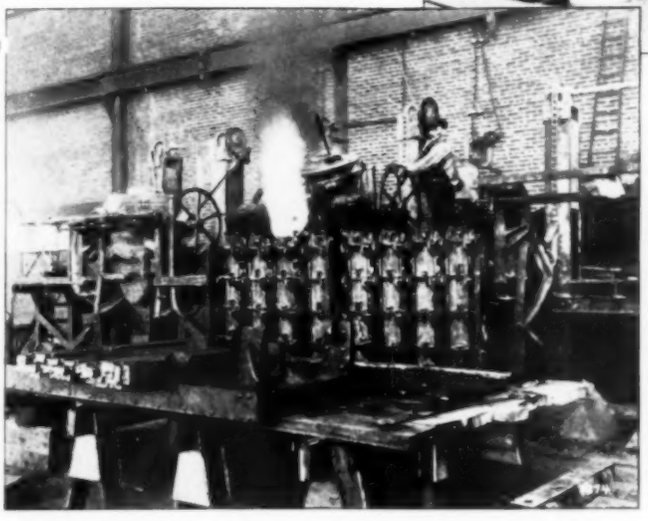
AJAX · WYATT ·





Submerged Resistor

Induction Furnaces



Ajax Electric Furnace Corp.

DIVISION OF THE AJAX METAL CO.

08 Frankford Ave. Philadelphia, Pa.

ASSOCIATED COMPANIES

THE AJAX METAL COMPANY
Non-ferrous ingot metal for foundry use.

AJAX ELECTRIC CO., INC.
Ajax-Hultgren salt bath furnace and resistance type electric furnaces for all heat treating operations.

AJAX ELECTROTHERMIC CORP.
Ajax-Northrup induction furnaces for melting, heat treating and surface hardening.

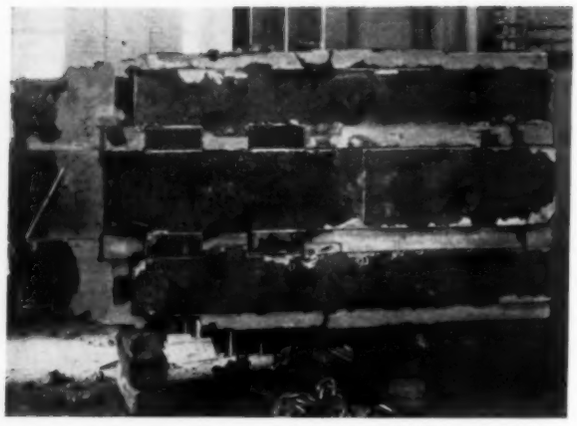


Fig. 7—Large casting with numerous cores as it comes from the foundry

Modern Cleaning Methods

(*Concluded from page* 46)

Side walls of the room contain large air ducts, open at the bottom and connected at the top with the dust arrester in back of the room. When the doors are closed and the arrester motor turned on, a perceptible current of air is sucked downward and up through the ducts by the impeller. This disposes of all dust in the manner previously descibed in connection with the tumblast dust arrester. The dusty air exhausted from the blast room is replaced with clean air which flows in through ventilators in the roof of the room.

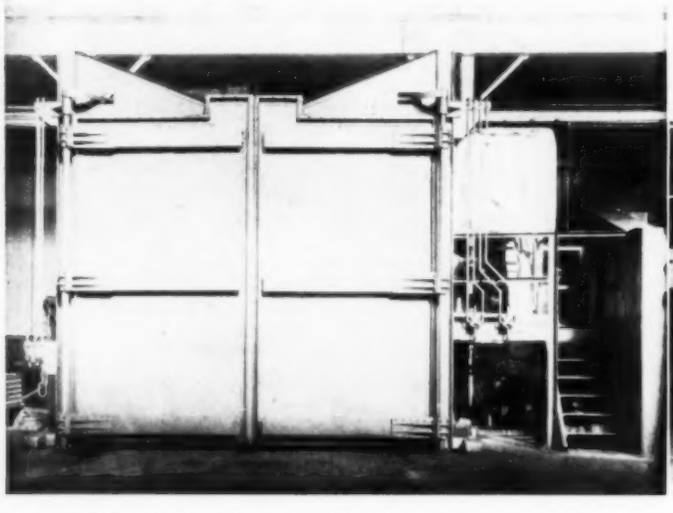
After blasting, the casting is deposited on a platform in a section of the building reserved for the purpose. Here it is chipped and ground with portable tools, as shown in Fig. 3 and finally, it goes to the nearby shipping floor and thence to the machine shop.

Three cement pits, or sumps, back of the hydraulic washer and blast room are shown in Fig. 6, with the dust arrester which serves the blast room. The pits are approximately 6 feet deep and 7 feet square. The first holds the sand laden water from the hydraulic washer, which drains back into it through the connecting sluiceway shown. It also receives drain water from the dust arrester shown in Fig. 1. Sand which settles in this pit is removed by the grab bucket shown, is deposited on the cement floor nearby to drain back, and finally is used over again.

Overflow from this tank runs into the second or adjoining tank which also catches the drainage from the blast room arrester. Settlings from this pit are waste. Between the second and third pits a coke filter cleans the water which runs through it into the third or last pit. This pit is the source of supply for the hydraulic washer. The water is pumped from it over and over again by the 75-horsepower centrifugal pump, previously mentioned.

After the pits have once been filled, they are maintained at the desired level by rain water from the roof of the building, conducted through suitable piping. Supply always has been sufficient.

Fig. 10—Casting cleaning shop is a modern, fireproof building



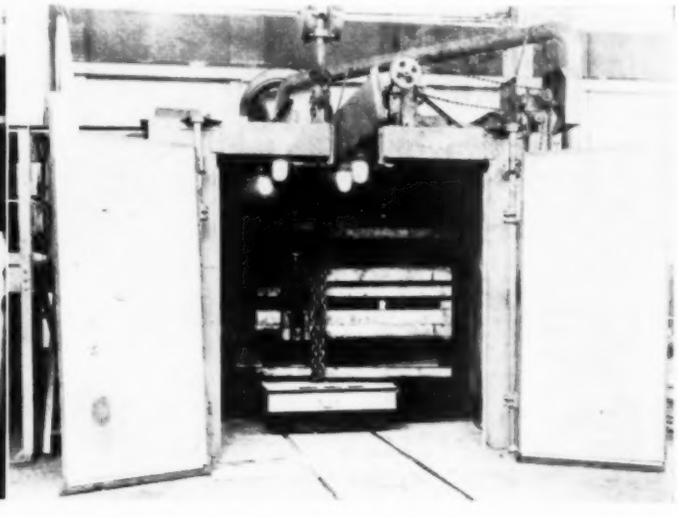
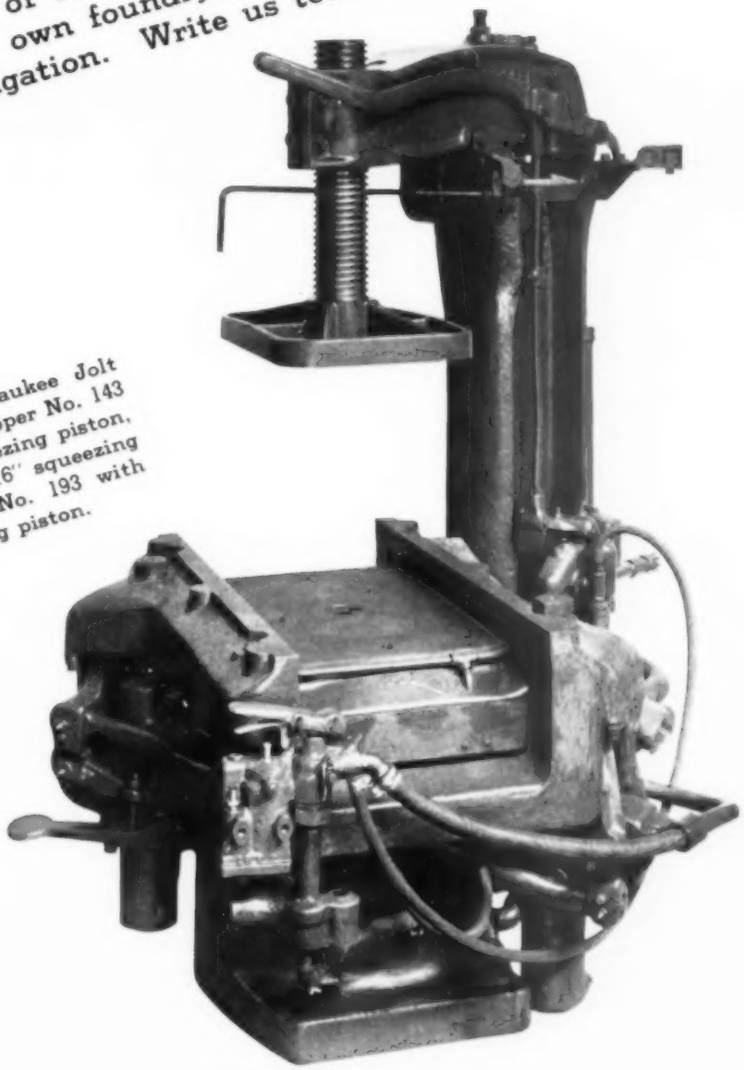


Fig. 8—Hydraulic wash room with doors closed showing the operator's platform. Fig. 9—Blast room with casting on flat car. Overhead pipe connects with dust arrester. Note narrow door in roof and also mechanism for automatically removing grit and sand from hopper underneath room

FOLLOW THROUGH!

In the manufacture of molding machines, as in the game of golf, it's the "follow through" that brings results. Milwaukee Foundry Equipment engineers are practical men who have made a careful analysis of the industry's requirements. Their many years of foundry experience amply qualifies them to design and build BETTER molding machines. But they go even farther. They FOLLOW THROUGH to make sure the machine successfully meets the customer's individual needs. Why not let one of our engineers make a survey of your own foundry's requirements. No obligation. Write us today.



The New Milwaukee Jolt Squeezing Stripper No. 143 with 14" squeezing piston, No. 163 with 16" squeezing piston, and No. 193 with 19" squeezing piston.

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Nonferrous Alloys Available

(*Continued from page* 47)

the increase of zinc from 3 to 4 per cent which reduces the copper to 76 per cent. It will be noted that this composition also makes no mention of either phosphorus or nickel. However, it is not an uncommon experience to find up to 0.25 per cent maximum nickel as a component of this alloy.

Nickel Raises Melting Point

It is claimed frequently that presence of nickel even in small percentages tends to raise the melting point of the copper-tin matrix in which the lead is suspended so that it sets at a higher temperature which tends to hold the lead and retards segregation. Presence of phosphorus in the alloy does tend to make the alloy very fluid and some manufacturers contend that this increased fluidity resulting from the presence of phosphorus affects the distribution of the lead in an unsatisfactory way.

With 4 per cent zinc present there is little or no need for phosphorus to deoxidize the copper oxide in the copper. It simply is necessary to add some zinc first before the rest of the white metals are added, and a sufficient amount of zinc should be added to compensate for the zinc lost by this deoxidizing reaction. Iron in excess of 0.15 per cent is objectionable since it increases shrinkage and tends to increase the melting point. If the castings are to be sold in the rough, iron will be objectionable since it does tend to cause black spots on the surface. Antimony also tends to discolor the surface and also increases hot shortness when in excess of about 0.25 per cent.

As mentioned in the discussion on composition 1*BB*, sulphur as a means of aiding in the suspension of the lead is sometimes advocated by some producers although it does affect the strength adversely if present in any appreciable quantities, say in excess of 0.08 per cent. In all lead alloys silicon is objectionable. It tends to form slag and will cause casting difficulties just as aluminum does for this type of alloy. Neither aluminum or silicon should be present in appreciable quantities, say above 0.005 per cent. This composition often is recommended as an acid resisting material and also for bearings where some conformability or elasticity is an essential factor.

Cut Down Tin Content

Composition 1*DD* is essentially the old 80 per cent copper, 10 per cent tin, 10 per cent lead composition in which each tin and lead has been decreased by 2 per cent for one reason or another. In many of the specifications covering this 80-10-10 alloy, the limits of lead and tin are given as 8 to 12 permitting a plus or minus change in these elements of about 2 per cent. Some manufacturers in order to save expense cut down on the expensive ingredient tin to the limit, and when they do so they find that alloy will work better in their foundry if they likewise reduce the lead to a proportionate extent.

This, like its parent alloy 80-10-10 in some specifications permits up to 0.25 per cent nickel, up to 0.5 per cent zinc, and requires some phosphorus in order to insure the presence of an adequate deoxidizing agent. It is manufactured best by adding some of the phosphorus in the form of phosphor-tin or phosphor-copper to the copper before the lead and tin are added so that the dissolved copper oxide present in the copper has been properly reduced before these white metals are added. In many instances it has been found desirable to reserve some of the phosphor-copper or phosphor-tin deoxidizing material for addition after the white metals have been added and just prior to pouring of the alloy into the mold.

Fluidity Reduces Losses

This insures fluidity and in many ways helps to reduce foundry losses in defective castings if it is not abused by the overdosing of the alloy with phosphorus. The presence of up to 0.5 per cent maximum of zinc is permitted by some specifications in order that the alloy may be made from scrap, but if best results are to be obtained, zinc should be absent where there is a definite presence of phosphorus in the resulting composition. Of course, zinc up to 0.2 per cent in such alloys as this might be considered to be absent.

The presence up to 0.25 per cent nickel in this alloy, as permitted by some of the specifications, tends to refine the grain and it is claimed by some to increase definitely the density. It does tend to raise the melting point slightly. This results

(*Concluded on page* 97)

Table V

Compositions and Specifications of Nonferrous Alloys

No.	Copper	Tin	Lead	Zinc	Nickel	Phos-phorus	Alumi-num	Pouring Temp. Deg. Fahr.	Melting Point Deg. Fahr.	Specifications A.S.T.M.	S.A.E.	FED.
1AA	85	5	9	1				1750-1950	1625-1700	B30-36 (15)	66	
1BB	81	7	9	3				1750-1950	1625-1700			
1CC	76	7	13	4				1750-1950	1625-1700			
1DD	84	8	8					1750-1950	1625-1700			
1EE	75	8	15	1.5	0.50[1]	0.05[1]		1750-1950	1625-1700	B30-36 (18)		
1FF	77	8	15					1750-1950	1625-1700			
1GG	80	10	10	0.5[1]	0.25[1]	0.05[2]		1750-1950	1625-1700	B30-36 (16)		
1HH	79.3	10	10			0.7		1750-1950	1625-1700	B30-36 (17)	64	
1II	76	7	14.5	1.75	0.75			1750-1950	1625-1700			
1JJ	74	4.5	17	4.0	0.50[1]			1500-1800	1400-1650	B30-36 (19)		
1KK	75	7	18					1500-1800	1400-1650	B66-36T	67	
1LL	70.5	6	20	1	0.50	0.05[1]		1500-1800	1400-1650	B30-36 (20)		
1MM	70	9	21					1500-1800				
1NN	70	4	26					1500-1800				
1OO	72	0.5	27.5					1500-1800	1400-1650			
1PP[3]	87-89	0.5					7-9	1950-2250		B59-36 (A)	68 (A)	
1QQ	90						10	1950-2250			68 (B)	671 (B)
1RR[4]	89						10	1950-2250		B59-36 (B)	68 (B)	671 (B)
1SS[5]	86.2	0.3					10	1950-2250				
1TT[6]	82.5	0.5					13	1950-2250				
1UU[7]	78	2[7]		5[7]				1950-2250	1800-1850			QQC-593
1VV[8]	90						7	1950-2250	1800-1850			
1WW[9]	96.25	0.5						1950-2250	1800-1850			

[1] Maximum
[2] Minimum
[3] Iron, 2.5 to 4 per cent
[4] Iron, 1 per cent
[5] Iron, 3.5 per cent
[6] Iron, 4.0 per cent
[7] Silicon, 1 to 5 per cent
[8] Silicon, 3 per cent
[9] Silicon, 3.25 per cent

(*Concluded from page* 94)

in a higher point at which the whole mass cools and thus distributes the lead a little more uniformly if such is possible. Iron in excess of 0.25 per cent will be found to tend to discolor the skin as mentioned for the previous alloys of this series and also increases the shrinkage thus requiring an increase in the size and type of risers.

Antimony in excess of 0.25 per cent tends to increase hot shortness and also cause some discoloration. Sulphur in excess of 0.08 per cent does affect the strength adversely. Silicon in excess of 0.01 per cent and aluminum in excess of 0.005 per cent increase dross and tend to form hardspots and cause leakage if the castings are to be subjected to hydrostatic service. This composition is essentially a bearing alloy and is used commonly for a wide variety of bearings, although its parent alloy 80-10-10 is used more commonly since it is an alloy harder by reason of the increase in the tin content. It has good conformability and definitely is recognized as one of the comformable or plastic bearing bronzes.

Composition 1*EE* is one of the higher lead copper-tin bronzes in which the tin is definitely well up. This composition calls for 1½ per cent of zinc, indicating that it is primarily a zinc deoxidized bronze. However, it permits up to 0.05 per cent phosphorus, indicating that some producers of this composition have been adding phosphorus to it to increase its fluidity or to deoxidize partially the composition in spite of the fact that it is presumably deoxidized by the presence of zinc. Composition 1*EE* also permits up to 0.50 per cent nickel.

Castings Made from Scrap

It will be apparent from the fact that all of the elements, zinc, phosphorus and nickel are permitted that this composition is made very often from selected scrap. Since it has so much tin in it, it is obvious that it must be controlled carefully when made from scrap in order to be sure that the scrap is of the character that will deliver the requisite tin content so that the physical properties of the alloy are assured. It is a plastic or comformable alloy for use in bearings and is covered by A.S.T.M. Specification B30-36(18).

Composition 1*FF* is essentially composition 1*EE* with the elimination of the permissible nickel and phosphorus and the elimination of the zinc, thus making it a strictly copper-tin-lead alloy that will not permit the production from scrap unless that scrap so carefully has been analyzed as to be found free from either zinc, phosphorus or nickel. That procedure would be so expensive as to be a prohibitive method in the manufacture of this composition.

Both compositions 1*EE* and 1*FF* are used for the same purpose, namely, bearings that are to be plastic or comformable. The remarks relative to the effect of the different impurities, iron, antimony, sulphur, silicon and aluminum as referred to the previous alloys 1*AA*, 1*BB*, 1*CC*, etc. apply equally forcibly to alloys 1*EE* and 1*FF*.

Composition 1*GG* is the common bearing alloy known as 80-10-10, variations of which in reasonable wide ranges are not uncommon in the foundry industry. Composition 1*GG* permits up to 0.50 per cent maximum zinc, 0.05 per cent maximum phosphorus and 0.25 per cent maximum nickel. This composition is covered in the form of ingots by specification A.S.T.M. B30-36(16), and in the form of castings by A.S.T.M. specification B66-36T.

Deoxidized with Phosphorus

It regularly is made from new metals by deoxidizing with phosphorus and when made from scrap, of course, it is still deoxidized with some phosphorus. However, it likewise is affected in a deoxidizing way to some extent by the presence of some zinc which creeps in through its presence in scrap. Nickel also creeps in as a component by some of the scrap having been nickel plated and while this is not an objectionable element, it does tend to increase the melting point.

Presence of iron in excess of 0.15 per cent does affect the hardness and tends to increase the shrinkage characteristics of the alloy to some extent. Antimony in excess of 0.25 per cent increases the hot shortness to some extent. Sulphur in excess of 0.08 per cent effects the strength adversely and tends to discolor the skin. Silicon causes hard spots and dross and should not be present in excess of 0.01 per cent, and aluminum in excess of 0.005 per cent will tend to cause this alloy to leak under hydrostatic service.

This article is the fifth of a series on nonferrous alloys available to the foundrymen. Previous articles have appeared in the January, February, March and April issues. The next will appear in the June issue.

Pacific Machinery & Tool Steel Co. has been made distributor in the Northwestern states for G. S. Rogers & Co., Chicago. Rex DeLong will head the newly created processing materials division of the Pacific Machinery & Tool Steel Co. and will have charge of the sale of the wide variety of products including liquid carburizers, quenching and core oils, etc.

Cincinnati Chapter Welcomes A.F.A.

(*Concluded from page* 34)

dent of the Farm Equipment institute. This award lecture was instituted in 1938 to bring to the members of the association at its annual business meeting outstanding presentations of general business and industrial problems. The first lecture presented last year was given by Charles R. Hook, president, American Rolling Mill Co. and at that time, president, National Association of Manufacturers.

A dinner for engineering and shop practice instructors will be held Tuesday evening under the auspices of the committee on cooperation with engineering schools. Frederick G. Sefing, International Nickel Co., Bayonne, N. J. and chairman of the committee will preside. A dinner for chapter delegates also will be held on Tuesday evening.

Through the efforts of the A. F. A. committee on apprentice training, many foundries and foundry organizations have participated in local apprentice molding and pattern making competitions. The winners of these local contests will have their castings and patterns sent to the Cincinnati convention for judging in the national contest. At that time prizes provided by the A. F. A. board of awards will be awarded to the four groups.

Adventures of Bill

(*Concluded from page* 58)

like regularity the man wiggled into the bushes and found CIO spread out like a setting hen over several birds in a hole in the ground. After he had found them he had covered them all over and then in regular succession had lifted one foot and released one bird at a time!

"What do you think of that for a story? Purry good, hey?"

"Purry good Johnny, but that ain't the way I heered it. The way I heered it One old Irishman says to another old Irishman, S-a-a-a-y,' he sez. 'Can you tell me categorically and historically how many fathoms of wind blew through the north chancel window in the old abbey in Donegal the year of the big wind in Ireland. Furthermore, can you prove your contention by algebra, trigonometry and the rule of double supposition?'

"To give your story the proper finish you should have the dog ring a bell at each hit and present the gunner with a two-for-five cigar. If I was telling the story—"

"Skip it," said Bill "I'll polish it up to suit myself before I go to Cincinnatah on the banks of the rolling O-hi-O."

Machine Tool Castings

(*Continued from page* 39)

rigid receptacle that will produce a casting true to line and dimension, a duplicate, less shrinkage and contraction, of the original pattern. A hard, dried mold inside a steel flask will not yield under the weight and static pressure of the metal poured into it. The second purpose for drying the molds is to eliminate the potential hazard incident to excessive amount of moisture in green sand. The cost of drying the molds is regarded as the premium paid on a form of insurance. A careful check constantly is exercised over the condition of the sand, but so long as the human element is present it is considered better to be sure than sorry. Although highly improbable, the possibility exists that a batch of unsuitable sand might slip through. Here the mixer solemnly knocks on wood and declares virtuously it ain't never happened yet.

In fact only a pessimist would think of such a thing. The sand is watched closely from the time the flasks are shaken out until the following set of flasks are filled. Practically all the operations are on a mechanical basis. From the shakeout station the sand is carried on a belt to the boot of an elevator which discharges it through a screen into a storage tank. The tank in turn delivers measured amounts to a muller type mixer where any necessary amounts of water, sea coal and new sand or clay are added on instruction from the sand laboratory. The prepared sand then is taken by suitable belt arrangement, or by tote boxes handled by crane or lift truck, to the vicinity of the various molding stations.

Sand Tested Regularly

In the sand laboratory approximately 100 tests per day are carried out. The work includes tests on moisture content, porosity, compression strength, tensile strength and screen analysis. On the sand for the dry sand molds the permeability is maintained at 100 or over, clay content 14 per cent, moisture 7½ to 8 per cent, green strength 6½ pounds, screen analysis 40 mesh. On the green sand molds for comparatively light castings the screen analysis remains the same, but the permeability ranges from 30 to 40, clay content from 14 to 15 per cent, moisture content 7½ to 8 per cent and green strength 6½ pounds. In addition to the clay approximately 6 per cent pitch binder is incorporated in the facing sand for the dry sand molds.

The Cincinnati Milling Machine Co., is a licensee of the Meehanite Metals Corp. and melts iron for all castings according to formulas developed by that organization. The process has been referred to on several occasions in the pages of

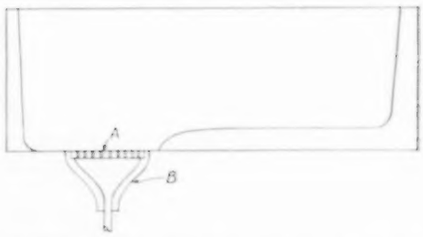

Fig. 13—Metal from pouring basin flows into the sprue through a dry sand core "B" covered with a perforated core "A"

THE FOUNDRY. For present purpose it is sufficient to say that the molecular structure of the metal is changed through the addition of calcium silicide. Following proper melting conditions it is claimed the metal presents a dense, homogenous, uniform structure with improved strength and other physical properties to meet severe specifications.

Metal and fuel are under close laboratory control from the purchase of the raw materials to the delivery of the castings to the machine shop. Cupola charges are made up according to definite instruction as to composition and weight on a truck equipped with a scale. Even the air required for combustion is delivered by weight through a blower with a compensating device which regulates the volume to correspond with variation in atmospheric conditions.

Iron for the majority of the castings is melted in a pair of twin cupolas standing side by side and lined to an inside diameter of 60

(*Concluded on page* 100)

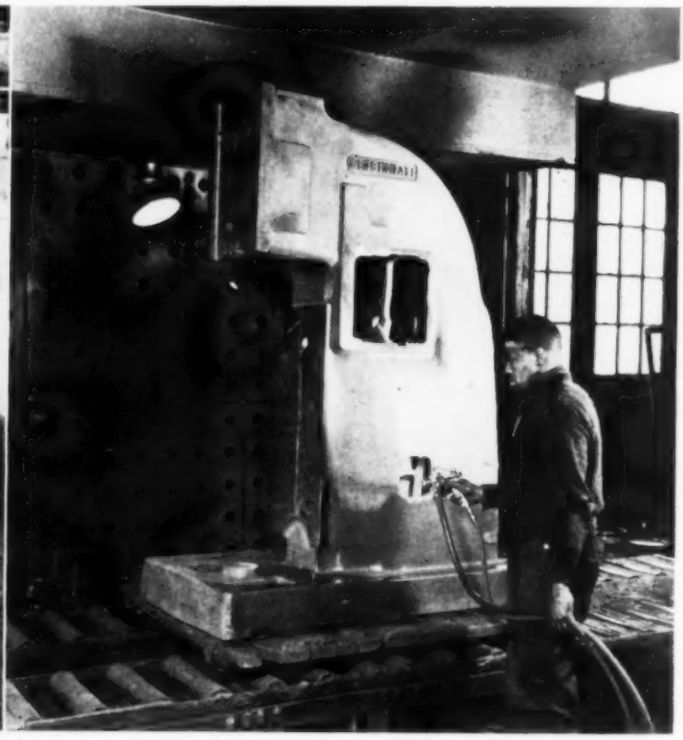

Fig. 11 (Left)—In certain instances to save space on the core plate, two core boxes are incorporated in a single unit. Fig. 12 (Right)—Cleaned castings are sprayed with a coat of paint, gray on the outside and red on the inside

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(*Concluded from page 98*)
inches. Each cupola is operated on alternate days. A third cupola in another part of the foundry and lined to 36 inches is employed to melt the iron for the light castings. Bottoms of the two larger cupolas are located higher than usual from the floor to permit discharge of the metal from either spout into mixing ladles and thence into the ladles by which it is conveyed by crane to the floors where the molds are set up for pouring. Rapid handling reduces temperature loss to a minimum.

In addition to the routine laboratory tests, a quick wedge test is taken from approximately every 1000 pounds of metal melted. This test does not take more than a minute. By breaking the wedge test piece the trained observer can determine instantly whether the metal is up to or below standard. In the latter case proper remedial measures may be applied in the form of small alloy additions to the metal in the ladle. Since the metal is melted extremely hot, 2900 degrees Fahr., the alloys readily are assimilated in the molten metal.

After the castings have cooled, the molds are shaken out over a vibrating screen, and the castings are taken to an adjoining room where they are chipped, ground and finished. The blacked, dry sand molds impart a smooth, clean skin to the castings so that supplementary cleaning is reduced to a minimum. Through the use of well matched, rigid flask parts, patterns and cores, fins at the joint and around the core prints require very little chipping. The cleaned castings are sprayed with paint, gray on the outside and red on the inside and then taken directly to the machine shop, or to a stock room where they remain until wanted. The paint later serves as a ground coat for the final paint coat after the machine has been assembled and made ready for shipment to a near or far distant customer. In addition to outlets in all principal United States cities, the company maintains sales representatives in every country in the world where machine tools are employed.

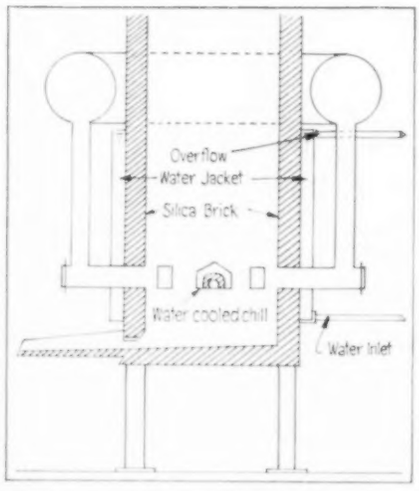
Operates Cupola for 120 Hours Before Dropping Bottom

By JOHN SONNENFELD

A WATER jacket cupola, capable of operating continuously for 120 hours, was developed at the plant of the Reading Iron Co., Reading, Pa., in 1935 and kept in operation for over 2 years until the liquidation of the company in September, 1937. The requirements were that the cupola deliver 7 tons of iron per hour to the mechanical puddlers at temperatures between 2600 and 2700 degrees Fahr. in 7000-pound lots every 30 minutes.

Operations for each week started at 5 a. m. Monday and continued 24 hours per day until Saturday. After each 4-hour period, melting was suspended for an hour while bottoms in the mechanical puddlers were repaired. This period provided an opportunity for necessary cleaning of tuyeres and occasional removal of a slight bridging. Operation was very regular and no trouble was experienced in holding the cupola in operation the full working week.

Occasionally when delays occurred through trouble at the puddlers, the coupola, fully charged, was held for 4 hours without developing a frozen tap hole. Where a longer than 15-minute holdover was necessary the ordinary clay stopper had a round core in the center. This core was made of regular oil sand and was about ⅛-inch smaller than the tap hole. A water cooled chill was set in the lining to keep the lining around the slaghole from burning out. Space was provided for a clay lining which easily could be repaired during bottom repair periods. The melting zone was lined with silica brick 6 inches thick. Above melting zone firebrick was used.



Melting zone lined with silica brick and surrounded by a water jacket ran continuous 120-hour heats over a 2-year period in an eastern foundry

A waterjacket welded to the cupola shell extended from a point 6 inches from bottom plate up to 6 inches above the melting zone. Water entered near the bottom and overflowed through a pipe near the top. As a result of the heat interchange with continuously circulating water in the waterjacket, the silica brick lining usually was 2 to 4 inches thick after 120 hours of operation. Occasionally on bad brick joints, openings would form, ½ to ¾-inch wide between bricks, but the lining never burned entirely down to the shell or even to the film of original clay mud put in when the cupola was relined.

Shortly after the bottom was dropped Saturday morning and the drop cleared away, a bricklayer knocked out the lining from the melting zone above the tuyeres and in 3 to 4 hours the new lining was laid in. Clay mud was employed between bricks and shell for a tight fit, but the bricks were laid close. By 2 p. m. Saturday, the cupola was ready for operation.

Without the bottom repair periods continuous operation would have been impossible due to bridging. Attempt was made by another foundry to change one cupola over and operate it straight through. Bad bridging set in after 12 hours continuous operation at high wind pressure. Where rest periods of at least 15 minutes every 2 or 3 hours are possible a coupola similar to that shown in the accompanying illustration should prove very advantageous over long melt periods. Coke ratio of 1 to 10, and better was normal, with 25 to 35 per cent iron and steel scrap in the charge.

Book Review

Machine Molding (Maschinenformerei), by U. Lohse, paper, 64 pages, 6 x 9 inches, published by Julius Springer, Berlin, Germany, and supplied by THE FOUNDRY, Cleveland, and in Europe by the Penton Publishing Co. Ltd., London.

Printed in German, this volume is one of a series of workmen's handbooks, and discusses various phases of molding by machine in detail. It covers principles of molding machines, machines employing some hand ramming, hand squeezer machines, pneumatic squeezers, jolt machines, squeeze-jolt machines, centrifugal sand throwing machines, and special molding processes. Different types of core machines also are described. Final chapter is devoted to a summary and review.

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European Foundry Practice

Digest of Recent Literature Covering Various Phases of Castings Manufacture

Alloy Cast Iron

"Loded" Cast Irons, The Engineer and Foundryman, Johannesburg, South Africa, February, 1939.

This article is an abstract of a paper presented by H. J. Young before the Institute of Marine Engineers, London, England, and describes a new range of high duty gray irons for cylinder liners, piston rings, etc. Structure of the irons is said to be all-pearlitic, and they can be used in the as-cast condition. The irons can be made with any iron foundry's normal appliances but metallographic control is essential. The process employs any silicon content from 2.5 to say 7 per cent; many castings being made with a silicon content from 4.5 to 5.5 per cent. Stabilization is accomplished by use of 1 to 4 per cent chromium depending upon silicon content and the thickness of section.

Malleable Cast Iron

Contribution to the Study of Malleablization of White Cast Iron (Contribution a l'Etude de la Malleabilisation de la Fonte Blanche), by M. Leroyer, *La Fonte*, Paris, France, September-October, 1938.

The author discusses more concisely the views expressed at great length in his book, *La Malleable*, published in 1936, and which attracted considerable attention. According to the author American black heart malleable, which is graphitized completely and not decarburized, and European white heart malleable which is decarburized completely, are but the extreme theoretical limits of a continuous series of products. Study of those can and should be carried on together and should constitute a harmonious whole. Factors which influence graphitization and decarburization are discussed, and a judicious co-ordination of these factors should, in the opinion of the author, enable the metallurgist to obtain castings having optimum qualities for each specific purpose within limits afforded by equipment at his disposal. Numerous diagrams and micrographs illustrate the text.

Centrifugal Casting

Present Status of Centrifugal Casting (Ou en est la Coulee Centrifuge), by G. Duberget, *La Revue de Fonderie Moderne*, Paris, France, January, 1939.

Centrifugal casting makes possible practically complete elimination of sink heads and gates in large or small castings. When it is considered that in some complicated castings and especially alloys with high shrinkage coefficients, heads and gates may amount to as much as 70 per cent of the weight of the casting, a considerable saving in metal is effected.

Another advantage particularly applicable to tubular form castings is elimination of cores. In gravity casting making cores amounts to nearly 50 per cent of molding labor. Another point is that pressure developed by centrifugal force causes the metal to fill perfectly even the smallest hollows in the mold, and even with alloys which, due to poor pouring qualities, only can be cast with difficulty by gravity.

In many cases use of the centrifugal method has made it possible to use much thinner webs or walls than would be possible in gravity casting. Walls of centrifugally cast pipe have been reduced 10 per cent with prospects of still further reduction. Tables are included which show that centrifugally cast alloys have better mechanical properties than when gravity cast (bronzes, brasses and aluminum bronze). Different types of centrifugal casting machines and their particular purpose are referred to briefly, and features which molds must possess due to stresses to which they are subjected are discussed. Possibilities of casting steel pipe are considered. Centrifugal casting lends itself readily to production of bimetallic castings such as rolls with a hard surface layer, and with the core and roll necks of a softer metal.

Steel Hardening

Temper Hardening of Steel and a Theory of Tempering, by S. A. Main, *Metal Treatment*, London, England, Quarterly, Winter, 1938-39.

The author develops an original theory to account for the increase in hardness observed during the tempering of certain types of steel. The explanation is based on a particular view of the constitution of quenched steels, and their behavior when heated. Phenomena associated with tempering are attributed to relations between austenite and martensite, which latter constituent is supposed to contain carbon in its elementary form in minute particles which combine with iron during tempering to form carbide.

Aluminum Bronze

Non-Ferrous Foundry Practice-Aluminum Bronze, by J. Laing and R. T. Rolfe, *The Metal Industry*, London, England, Jan. 20 and Feb. 3, 1939.

One of a series of articles on nonferrous alloys, this deals with aluminum bronze, giving information on corrosion resistance, casting difficulties, mechanical properties, constitutional diagram, heat treatment, and effect of heat treatment on physical properties. Further data are presented on the various specifications for aluminum bronzes, effect of alloying elements such as iron, manganese, and nickel, molding practice for aluminum bronze, gating and pouring practice, and casting temperature. With reference to the latter the authors indicate that pouring temperature may range from 2012 2057 degrees Fahr. in the case of heavy sections to as high as 2282 degrees with very thin sections. However, the average range is from 2147 to 2192 degrees.

Manganese Bronze

Non-Ferrous Foundry Practice-Manganese Bronze, by J. Laing and R. T. Rolfe, *The Metal Industry*, London, England, Jan. 6, 1939.

This article is part of a series on various nonferrous alloys, and constitutes a brief review of applications, properties, and foundry practice. The authors point out that a wide variety of compositions coming under the designation manganese bronze permit strengths from 62,000 to 100,000 pounds per square inch with elongation from 25 to 12 per cent.

Since manganese bronzes have a tendency to form drosses which are not reabsorbed by the metal and have a high solidification shrinkage, castings must be gated to avoid turbulent flow, and additional control of solidification is necessary to insure adequate feeding. The authors show several specific types of castings, and procedures employed to insure good, sound products.

Blowing Cores

Manufacture of Blown Cores (La Fabrication des Noyaux par Soufflage), by Rayond Guerin, *La Fonte*, Paris, France, Nov.-Dec., 1938.

Blown cores and machine for making them first made their appearance in the United States about the end of the last century, but it was not until some years later that the machines were developed to a point where their industrial application was warranted. After a brief historical reference, the author discusses principle of making blown cores, problems involved such as compressed air, core sands, the blowing machine with its accessories for producing the mixture of compressed air and core sand, and the core box. Each are discussed in detail accompanied by illustrations of machines used for the purpose with various kinds of cores made. The article concludes with some production figures.

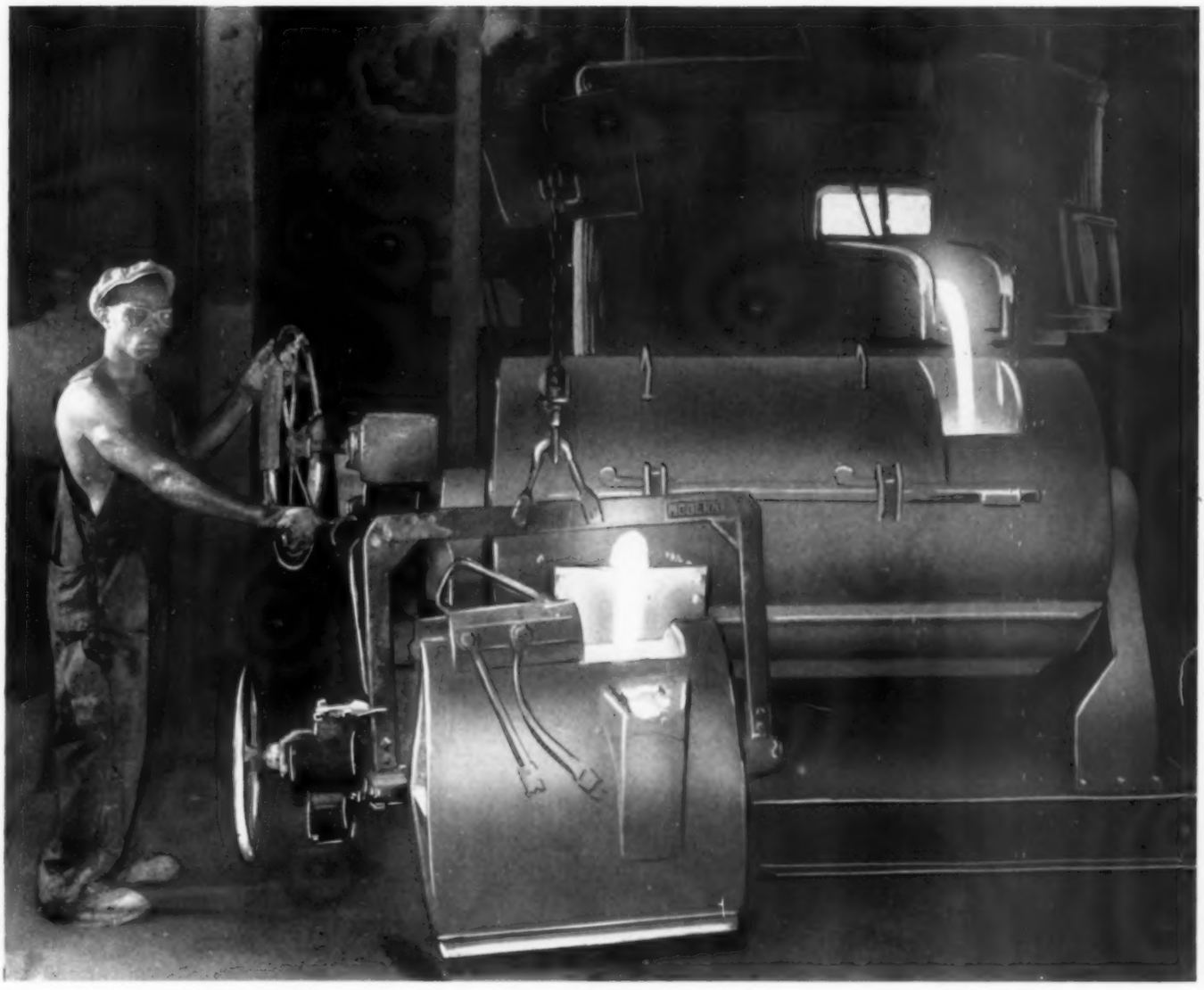
Cost System

A Costing System, by L. Aldridge, *Engineer and Foundryman*, Johannesburg, South Africa, March 1939.

According to the author advantages of a costing system are: Cost of every article or process is known; estimating data are provided; costing shows which branches pay; leakages are revealed; stock records are kept, and competition is rational. In installing a costing system four points should be borne in mind: Unnecessary elaboration should be avoided; the simplest system is always the best; a cost system must be adaptable to changing conditions and should be reviewed from time to time to eliminate wasteful features and supply further particulars and information where such is valuable to management; introduce a new cost system gradually; co-operation between technical staff and costing department is essential to success.

To make fullest use of a costing system the following main points must be considered: Estimates are compared with actual costs to prove accuracy of estimates and provide information for future estimates; costs of similar jobs carried on at the same time are compared which brings to light efficiency or inefficiency of different workmen or machines; indicates where losses are occurring before the job is finished; wages can be compared week by week, etc.; indirect wages likewise can be compared.

From that point the author then takes up a job costing system employed in his plant.



Cincinnati
foundries profit with
MODERN Covered and Insulated Ladles

Above photo shows the 3000 pound capacity Modern Mixing Ladle at the Williamson Heater Co. of Cincinnati, believers in advanced foundry methods. Ladle is shown receiving iron from the cupola and delivering into a half ton Modern Cylindrical Distributing Ladle.

Melting costs are greatly decreased and absolute uniformity of metal results from the use of this ladle equipment.

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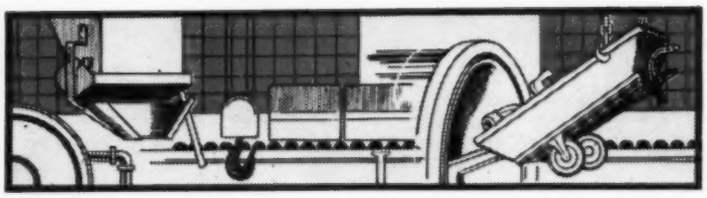


AND SUPPLIES

Cast Refractory

Johns-Manville, 22 East Fortieth street, New York, has developed a new light-weight refractory which may be cast into any desired shape to replace difficult brick construction, lining furnace doors, and for making small monolithic linings. The product is said to be suitable for working temperatures up to 2200 degrees Fahr. The material is called light weight firecrete. Its resistance to spalling is such that it will withstand direct exposure to flame temperatures. Sixty-five pounds of the material are required per cubic foot of finished construction. It is mixed with water, cast into a form, and 24 hours later is ready for service.

Collects Dust

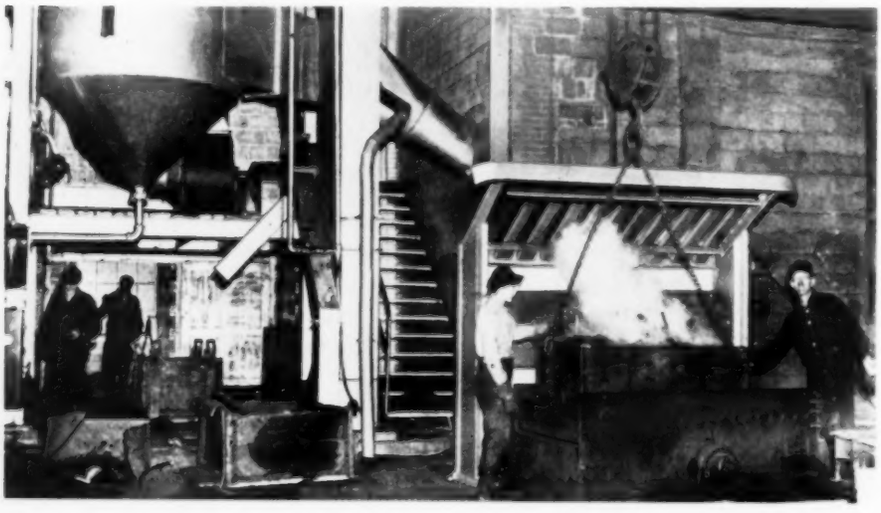
Claude B. Schneible Co., 3951 W. Lawrence avenue, Chicago, has introduced a special type hood known as the "Uni-Flo" for ventilating shakeouts, knockouts, sand conditioning, and other dust and fume creating foundry units. The hood, shown in the accompanying illustration, is designed to collect efficiently dust and fumes without interfering with molds or castings being handled. Units are designed to operate at various angles and can be installed in a number of positions. In use a fan draws the dust and fumes away from the operation and the operator. The hood spreads the drawing action over a wide surface by a relatively small plenum chamber and specially shaped, adjustable louvers. Dirty air gathered by the hood is collected by a multiple wash dust and fume collector washes the air, reducing the dust and fume to a sludge.

Improves Iron

Metaloid Co., 2306 Union Guardian building, Detroit, is marketing a material which, added to the metal charge in the cupola, is claimed to provide a method of processing iron to obtain increased tensile strength, toughness, grain refinement and improved machineability. The material is said to reduce the section sensitivity of cast iron, tends to reduce chill and local or general formation of free iron carbide without lowering strength. It also is claimed to provide a fluid and clean metal.

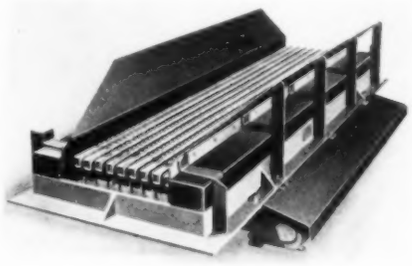
Rubber Coating

Self-Vulcanizing Rubber Co., 605 W. Washington boulevard, Chicago, has developed a new, single-coat, liquid rubber primer coating material which dries cold to a solid surface within an hour and withstands temperatures to 212 degrees Fahr.



Mold Shake Out

Royer Foundry & Machine Co., Kingston, Pa., has developed a new type of mold shake-out which operates on a balanced twin cam action. As shown in the accompanying illustration, alternate sets of bars operating in alternate cycles



form a grizzly upon which molds or flasks are placed. Shaking out is accomplished by the even, alternate impulses of the rising and falling bars.

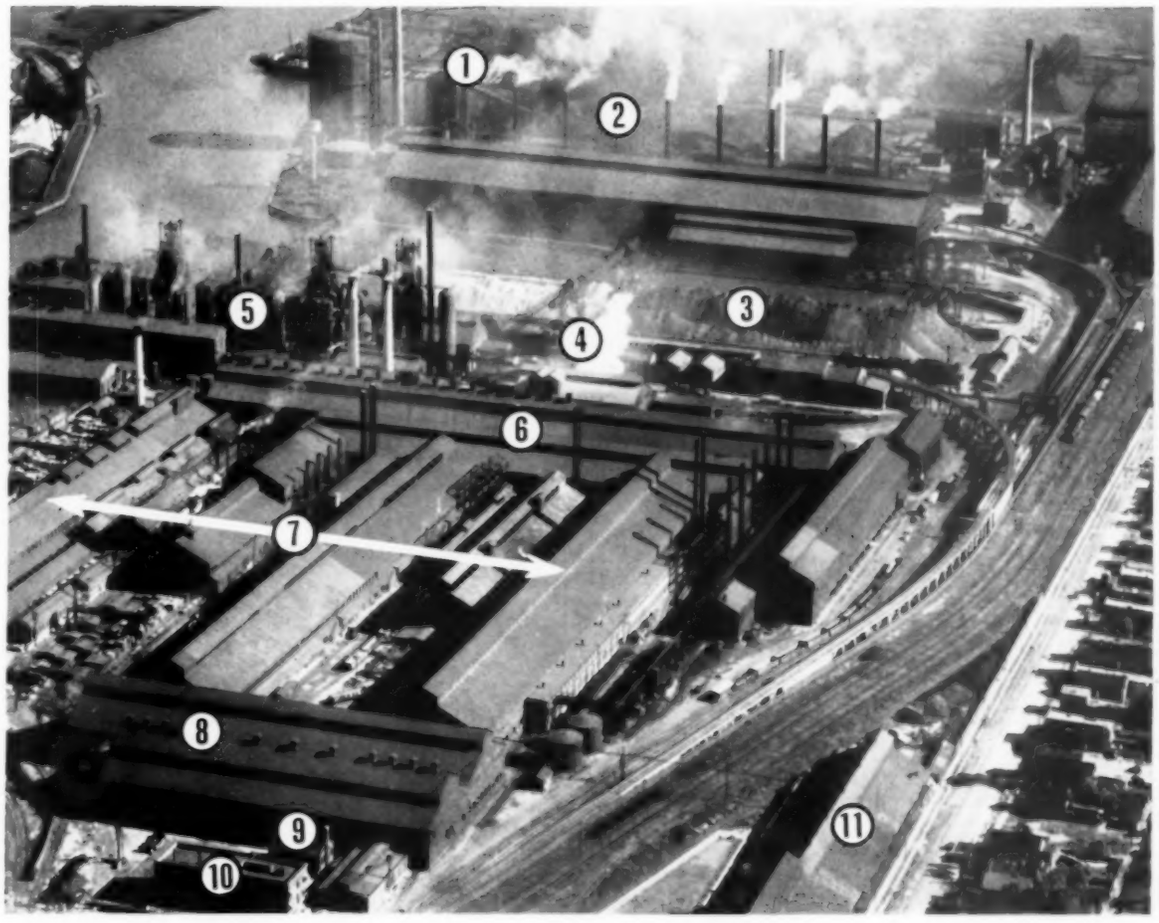
The shake-out operates flat with a definite conveying motion. It can be mounted over a conveyor belt, sand hopper, or other receptacle into which the shake-out sand is to be deposited. It operates with a reciprocating conveyor action, conveying flasks or castings off one end and onto a conveyor or other type of handling equipment. There are claimed to be no dead zones. Also the castings do not work toward the outer edge or to the center. Horsepower requirement is low and the device will not clog or stall under overload. It is claimed that the device can be ventilated easily.

Air Compressor

Worthington Pump & Machinery Corp., Harrison, N. J., has developed a portable air compressor with power take-off drive. Consisting essentially of a compressor driven through multi-V-drive on a drive unit installed between truck transmission and the universal joint of the propeller shaft, the new unit combines portability with utilization. The compressor is of the 3-cylinder 2-stage radial air cooled type and is said to include many modern features of construction.

WISCONSIN STEEL COMPANY, CHICAGO

a complete plant with facilities for every step in alloy and carbon steel and pig iron production



KEY—

1. Byproduct coke ovens.
2. Open hearth furnaces.
3. Ore docks.
4. Pig casting machines.
5. Blast furnaces.
6. Blooming mills.
7. Merchant and universal mills.
8. Storage building and shipping dept.
9. Metallurgy laboratory.
10. General offices.
11. Cold-drawn shafting mill.

Air view of Wisconsin Steel Company plant by Chicago Aerial Survey Co.

WISCONSIN STEEL COMPANY is well equipped—from raw material source to finished product—to take care of your alloy and carbon steel and pig iron requirements. Our own ore mines, ore boats, coal mines, coking plants, blast furnaces, pig machines, open-hearth furnaces, blooming mill, bar mills, and cold-drawn mill enable us, as the keyed photograph above indicates, to control our output of high-quality products through every process of manufacture.

Our large staff of metallurgists and practical foundrymen serves the double purpose of keeping product quality high and rendering a valuable consultation service to our customers.

We invite users of alloy and carbon steel and pig iron to write or phone us for complete information concerning our products.

WISCONSIN STEEL COMPANY

180 North Michigan Avenue **Chicago, Illinois**

WISCONSIN

Alloy and Carbon Steel **Pig Iron**

Filters Air

American Air Filter Co. Inc., Louisville, Ky., has placed on the market a new type of air filter which combines electrical precipitation

and adhesive impingement principles for cleaning air. The device, shown in the accompanying illustration, and known as the "Electromatic" air filter employs a front curtain which acts as a precleaner to remove heavier dust particles, bugs, or scraps of materials that might short-circuit the ionizer or the collector plates in the rear curtain. Fine dust and smoke particles escaping the front curtain pass through the ionizing unit in the center of the filter where they receive a definite electrical charge.

Entering the electrostatic field of the rear curtain the ionized dust particles are attracted to charged plates where they are held in an oil film until removed in the oil bath. Filter curtain is of new design providing necessary electrical insulation of plates and means for charging or grounding alternate plates in certain sections of the curtain. It meets requirement of reverse direction of rotation so that accumulation of dust and dirt on the front curtain is removed in the oil bath leaving rear curtain clean and freshly oiled. Entire casing of filter and front curtain is grounded thoroughly. Ionizer is enclosed entirely, and the rear curtain is protected by a heavy, close-mesh grill which prevents accidental contact. The filter is made in standard sections varying from 5 to 13 feet in height.

Shin Protector

Ellwood Safety Appliance Co., Ellwood City, Pa., has developed a shin protector which it is claimed can be worn with comfort either inside or outside the clothing. The shin guard is fiber formed to the contour of the human leg. Three horizontal ribs add strength and rigidity. Four brass eyelets, two at each side accommodate two straps for attaching the guard in position. At the top and bottom of each guard a molded sponge rubber pad is used between the inside of the guard and the wearer's clothing. This cushion results in comfort and also acts as a shock absorbing device. It is claimed that absolute freedom of leg and foot action is assured with maximum protection to the shins.

Heat Measurement

Harry W. Dietert Co., 9330 Roselawn avenue, Detroit, has developed a new pyrometer unit for determining accurately the temperature of molten gray and white iron by an immersion thermocouple. The thermocouple is 1⅛ inches in diameter and 19 inches long, and depth of immersion does not affect the accuracy of the readings. Life of the thermocouple is claimed to be better than 100 immersions. Each couple receives a stabilizing treatment which is said to insure ac-

curacy for the life of the couple. Iron and slag will not adhere to the couple.

The unit comes to the maximum temperature in 15 seconds after immersion. It is available in two types; a portable type as shown in the accompanying illustration, and a stationary type. The latter employs a flexible extension lead connected to the wall type pyrometer with a large dial which may be read at 50 feet. Portable model is equipped with a sturdy meter having a nonbreakable crystal. Temperature scale is 6 inches long, and reads from 1600 to 3200 degrees Fahr. in 20-degree divisions. Weight of portable model is 8 pounds, and overall length is 47 inches.

Rotary Furnace

Foundry Equipment Ltd., Linslade works, Leighton Buzzard, England, has placed on the market a new type rotary furnace which may be fired with pulverized coal or with oil. The furnace is made in capacities from ¾ to 5½ tons. Body of the furnace is a cylindrical steel casing revolving on two rails which run on four rollers. The two rollers situated at the burner end are power driven. Pulverized fuel is stored in a hopper which has control arrangements for driving the requisite amount of fuel to the furnace by an endless belt and valve control. Amount of coal dust introduced into the furnace can be controlled at will. A fan or positive blower can be used for operation of the furnace.

The burner is of special design so that the pulverized fuel is diffused into the combustion draft. The burner is protected by a refractory face. Gases, resulting from combustion, escape through an outlet opposite the burner and enter into a chamber made of steel plate protected by refractory lining. The chamber can be pushed out of the way on a track during slagging or addition of various alloys in the furnace. The loading arrangement is attached to the furnace and it runs right into the furnace. Turning a wheel inverts the charging bucket so that its charge is deposited in the furnace. A further half-turn of the wheel brings the charger back into its original position for refilling. The furnace can be operated with oil by making certain modifications.

Respirator

A respirator, having a twin filter area of over 46 square inches, has been introduced by H. S. Cover, South Bend, Ind. The filters, of special felt, are adjustable, removable and easily replaced when desired.

Face piece, as shown in the accompanying illustration, is of soft rubber, to provide an air tight fit on any shape of face. The unit may be folded to fit in the pocket and is built to withstand hard usage. A face cloth is provided for the comfort of the wearer.

It is claimed that the respirator

does not interfere with conversation and that plenty of clearance has been left for spectacles or goggles.

ROTO-CLONE

Will be Represented at the Forty-Third Foundry Convention Cincinnati, Ohio May 15th-18th, 1939

with factory engineers available to discuss any FOUNDRY DUST PROBLEM

Be sure to check on the Type W Roto-Clone

AAF Headquarters will be in the Netherland-Plaza Hotel

AMERICAN AIR FILTER CO., INC., Louisville, Ky.

INCORPORATED

AIR FILTRATION AAF DUST CONTROL

Control Pyrometer

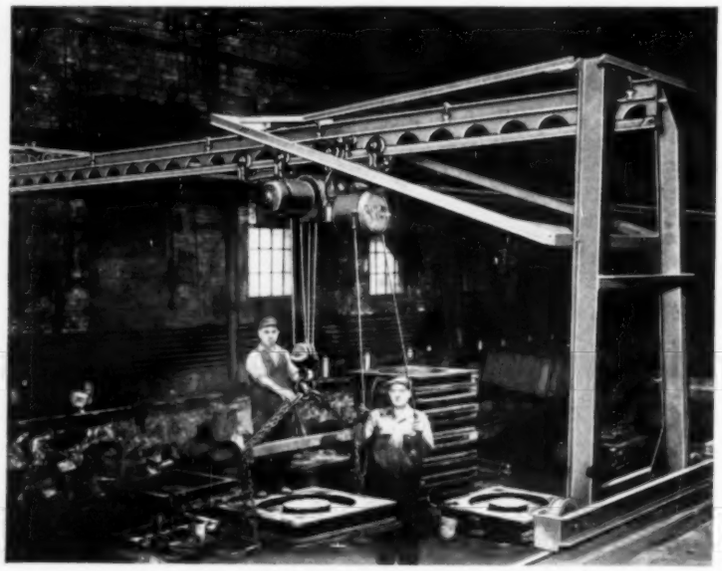
Illinois Testing Laboratories, Inc., Chicago, has placed on the market a pyrometer controller for automatically controlling temperatures of heat treating furnaces, melting pots or other heating devices at a definite predetermined point. Principle of operation of the device, which is shown in the accompanying illustration, is electronic similar to a radio circuit. Pointer of the indicating pyrometer carries a small vane, and an adjustable target is provided which carries two condenser plates or vanes. The vanes are the capacitive element of a tuned circuit. Except at the point when the temperature indicating pointer and the target coincide, the circuit is unchanged. When the temperature pointer with its vane approaches the temperature setting, the vanes of the pointer and target interleave and produce a circuit change which in turn operates a relay.

The temperature indicating pointer is free to give continuous indication and control. All circuit elements are operated considerably under the rating to insure against early deterioration and breakdown. Should tube burn out occur, the furnace is shutoff automatically; insuring against furnace overheating. Vacuum tubes are replaced easily. Standard temperature ranges 0-300, 0-400, 0-500, 0-600, 0-800, 0-1000, 0-1200, 0-1600, 0-2000, 0-2500, 0-3000 degrees Fahr., or Cent. equivalent can be calibrated and furnished for iron-constantan, chromel constantan, chromel-alumel, platinum-platinum 10 per cent or 13 per cent rhodium depending on equipment and range.

CLEVELAND TRAMRAIL

OVER HEAD HANDLING EQUIPMENT

FOR ALL FOUNDRY HANDLINGS



• A hand propelled gantry crane of relatively long span operating over part of the area covered by a large cab controlled, overhead crane. By using the Single Leg Gantry Crane for handling the lighter loads the effectiveness of the heavy crane is increased and time lost by men waiting for a lift is eliminated.

• Cleveland Tramrail Gantry Cranes are available in single and double leg type, for hand or motorized operation.

ALSO BUILDERS OF CLEVELAND CRANES ALL WELDED

CLEVELAND TRAMRAIL

DIVISION OF

THE CLEVELAND CRANE & ENGINEERING CO.

1155 Depot St.

WICKLIFFE, OHIO.

Or Consult Your Phone Directory under Cleveland Tramrail

Spray Gun

Turner Brass Works, Sycamore, Ill., has developed a metal spray gun shown in the accompanying illustration and presenting new features including: Heat supplied by a sturdy trouble free blow torch, low fuel cost, low air pressure required, any standard rods or bars of solder may be used, design of nozzle for ruggedness, simplicity and cool spray, instantaneous control of spray from fine to coarse, reserve of molten metal to maintain temperature. Manufacturers recommend the gun for automotive body work, rapid inexpensive pattern and corebox work, fine detailed duplication, miniatures of new products, inexpensive scale models, rust proofing, fire protective covering, corrosion protection, decorative and art work, covering nonmetallic objects for plating and oxidizing.

SHOT *Cleanblast* GRIT

The new idea in metallic abrasive—"Cleanblast" is tempered! Results in actual use prove our claims of faster, cleaner blasting operations.

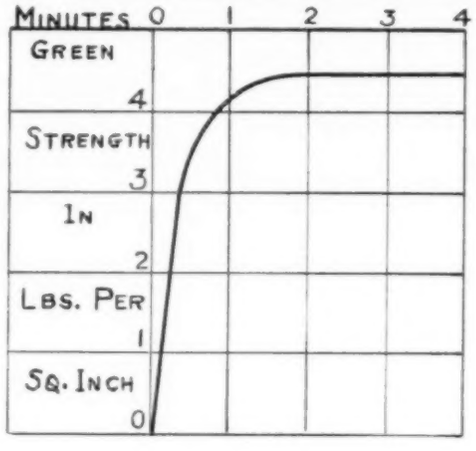
Rustless, dustless, sharp and fast, "Cleanblast" proves by both impact tests and tonnage of castings cleaned that it is a superior metallic abrasive.

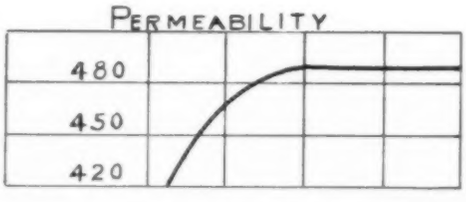
"Cleanblast" is manufactured in our own plant by a carefully controlled special process and it is sold only by its original producers. There is no substitute for "Cleanblast".

Shot—No. 5 to No. 30
Grit—No. 10 to No. 100

WRITE TODAY FOR FULL INFORMATION.

ALLOY METAL ABRASIVE COMPANY
311 W. HURON STREET — ANN ARBOR, MICH.





What Happens in the CLEARFIELD MIXER?

Here is a typical graph showing strength and permeability of foundry molding sand tested at 15 second intervals. Note especially the results of one minute mulling.

The CLEARFIELD is creating new standards in sand preparation efficiency. May we send literature?

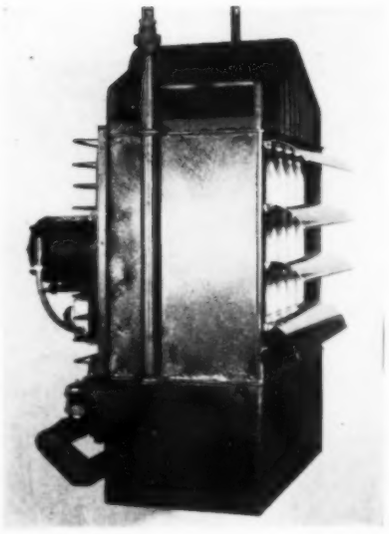
CLEARFIELD MACHINE CO.
Clearfield, Pennsylvania

Micrometer

A new indicating micrometer and comparator, which includes several interesting developments, has been introduced by the George Scherr Co., 128 Lafayette street, New York. The indicator is of the knife edge lever type. An anvil relieving button, which moves back the lower anvil for inserting and removing work, is said to eliminate the uncertainty of measuring feel. When the work is inserted and the button released, the anvil is pressed against the work by a light pressure return spring. Thus, no matter who does the measuring, it is claimed the reading will be the same.

Unit Heater

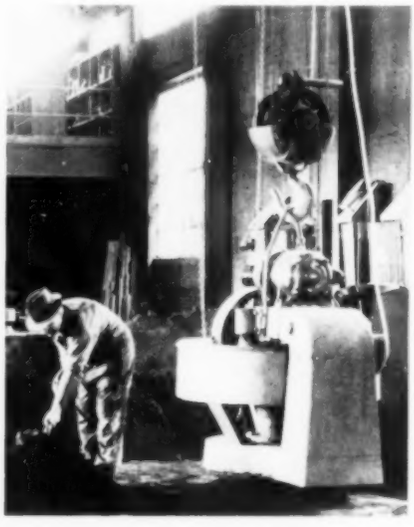
Automatic Gas Steam Radiator Co., 442 Brushton avenue, Pittsburgh, has developed a gas fired unit heater operating without steam or water and completely self-contained. The unit is suspended from the ceiling, as shown in the accompanying illustration, and employs natural or manufactured gas for fuel. In addition to heating, it may be adapted to other purposes such as ventilating, cooling and drying.



In operation gas fires into a combustion chamber, the products of combustion being passed upward through a bank of tubes and out at the rear of the housing. Air is passed around these tubes by a motor driven fan located on the back. The assembly includes a safety pilot which turns off the gas if the pilot goes out or burns too low to insure ignition.

Sand Mixer

Clearfield Machine Co., Clearfield, Pa., in the accompanying illustration, shows how a regular 4-foot diameter sand mixer may be converted into a portable unit by suspending it from the crane hook and connecting it to the crane power circuit. A modern foundry version of the old saying that if the mountain does not come to Mahomet, why Mahomet will go to the mountain. It is claimed that the method of preparing sand has proved convenient and economical where it has been tried out.



SLOSS QUALITY BEGINS WITH THE ORE—

But Does Not End There!

The basis of the uniformity and high quality of Sloss pig iron is the ore from which it is made. In each charge of a Sloss blast furnace, Sloss red ore and Sloss special brown ores are scientifically blended to produce consistently highest grade pig iron.

In addition, molten iron as it comes from a Sloss blast furnace, is so thoroughly mixed in a specially designed 125-ton ladle that every pig of each cast is absolutely uniform in chemical analysis and physical properties.

But ore does not become pig iron without the aid of men. The "human element" in the Sloss manufacturing organization is composed of men who have been steeped in the tradition that foundry iron is a particular raw material to be used for the sole purpose of making good castings. They are "foundry-iron-conscious", and the pig iron they make shows it.

Finally, Sloss Shirt-Sleeve Service Men *personalize* Sloss iron by cooperating with your foundry staff so that the quality of Sloss iron may be fully utilized. Address inquiries to Sloss-Sheffield Steel & Iron Company, Birmingham, Alabama.

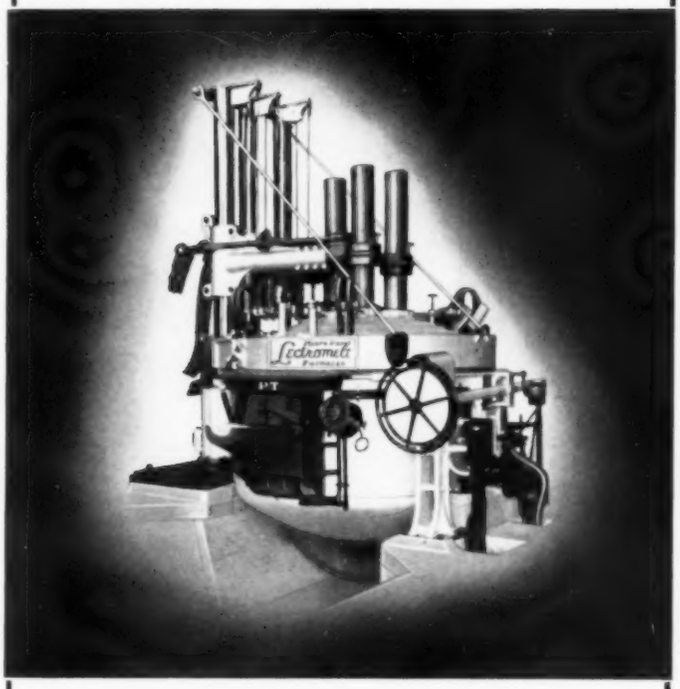
SHIRT SLEEVE SERVICE

SLOSS

SPECIALISTS IN FOUNDRY IRON

LADLE-MIXED FOR UNIFORMITY

Moore Rapid Lectromelt *Furnaces*



A 3 tons per hour top charge type Lectromelt Furnace

FOR

MELTING—REFINING SMELTING

ALLOY AND CARBON STEELS
GRAY AND MALLEABLE IRONS
COPPER, NICKEL AND ALLOYS
FERRO-ALLOYS, CARBIDE AND
SPECIAL PRODUCTS

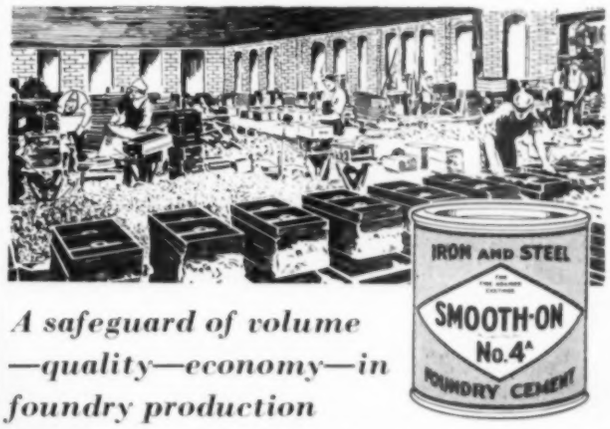
Furnaces available in top-charge type with quick raise and swing roof—also in door-charge types.

RAPID - ECONOMICAL - RUGGED

STANDARD SIZES 25 POUNDS
TO 50 TONS CAPACITY

PITTSBURGH LECTROMELT FURNACE CORPORATION

PITTSBURGH, PA.



A safeguard of volume —quality—economy—in foundry production

GET the most from what you already produce by keeping your percentage of rejects *low*. Otherwise, taking on more business merely means more burden and *smaller* instead of *larger* profits. Scrap only castings which are hopelessly bad. Don't incur production or price losses or delivery delays on any others on account of harmless surface flaws that mar nothing but appearance.

SMOOTH-ON No. 4

will render these depressions completely invisible by substituting a true surface of the same material, color, and texture as their surroundings.

Correct all sand holes, blow holes, pits, etc., with real metallized iron surface. Your reputation for good work and close inspection will be upheld and your product will be sought for its genuine superiority, and you'll soon find that castings once considered hopeless are contributing handsomely to the dividend account.

Good foundrymen everywhere have adopted this logical procedure, and if you want to compete for big orders with far greater assurance of normal profit, you will do the same.

Three compositions, each with distinct color, degree of lustre and fineness of grain offer a choice for perfect match in iron and steel castings of any shade, appearance and quality.

Smooth-On No. 4AA. For light gray castings and machined surfaces. Has high metallic lustre and takes a fine machine finish.

Smooth-On No. 4A. For medium gray castings. A fine-grained cement that has a good metallic lustre.

Smooth-On No. 4B. For dark gray castings. A cement of coarser grain and darker shade.

FREE
HARDENED and WORKING
SAMPLES

Make a critical test, and you will find your filling problems well solved.

Smooth-On Nos. 4AA, 4A and 4B are packed in 1-lb. and 5-lb. can, 25-lb. pail or 100-lb. keg. Mail coupon for prices and free hardened and working samples.

Smooth-On Mfg. Co., Dept. 17,
570 Communipaw Ave., Jersey City, N. J.

Please send samples of ☐ Smooth-On No. 4AA ☐ Smooth-On No. 4A ☐ Smooth-On No. 4B

Name.....

Address.....

5-39 .....

Do it with SMOOTH-ON

OBITUARY

HENRY A. WHEAT, 79, former president, Summit Foundry Co., Geneva, N. Y., died March 20. Mr. Wheat graduated from Hobart college in 1884 and later was active in the organization of a number of industries at Geneva.

* * *

PETER KLEIN, 52, died in Allen Memorial hospital, Oberlin, March 29, as the result of an automobile accident. As apprentice, molder and foreman he had been connected with the Acme Foundry Co., Cleveland, for the past 40 years.

* * *

Bruce Hill, vice president and sales manager of the Hill & Griffith Co., Cincinnati, died unexpectedly April 5 at Cincinnati. Mr. Hill was born April 22, 1886 in Dalton, Ga. He started his business career with N. C. & St. L. Railway in Dalton and later went to Atlanta, Ga., with the same organization. In 1906 he became connected with the Hill & Griffith Co. in the capacity of clerk and worked his way through various departments until he was made the vice president and sales manager in 1923. His brother John Hill is president of the Hill & Griffith Co. Mr.

Bruce Hill

Hill was active in the formation of the Cincinnati District chapter of the American Foundrymen's association, was a member of the general committee for the Cincinnati convention and served as chairman of the finance committee.

* * *

Fred O. Smith, 62, vice president, Vulcan Iron Works, Wilkes-Barre, Pa., died recently at his home in that city.

* * *

Henry Louis, emeritus professor of mining and internationally known mining engineer and metallurgist, died in Newcastle-upon-Tyne, England, at the age of 83.

* * *

Charles R. Crane, 80, former president, Crane Co., Chicago, died recently at his winter home in Palm Springs, Calif. He became vice president of the firm in 1894, president in 1912; resigning 2 years later.

* * *

William P. Bradbury, 53, vice president and general sales manager, Consolidated Ashcroft Hancock division, Manning, Maxwell & Moore Inc., Bridgeport, Conn., died recently. Mr. Bradbury joined the organization as an office boy and advanced to the position of vice president in charge of sales.

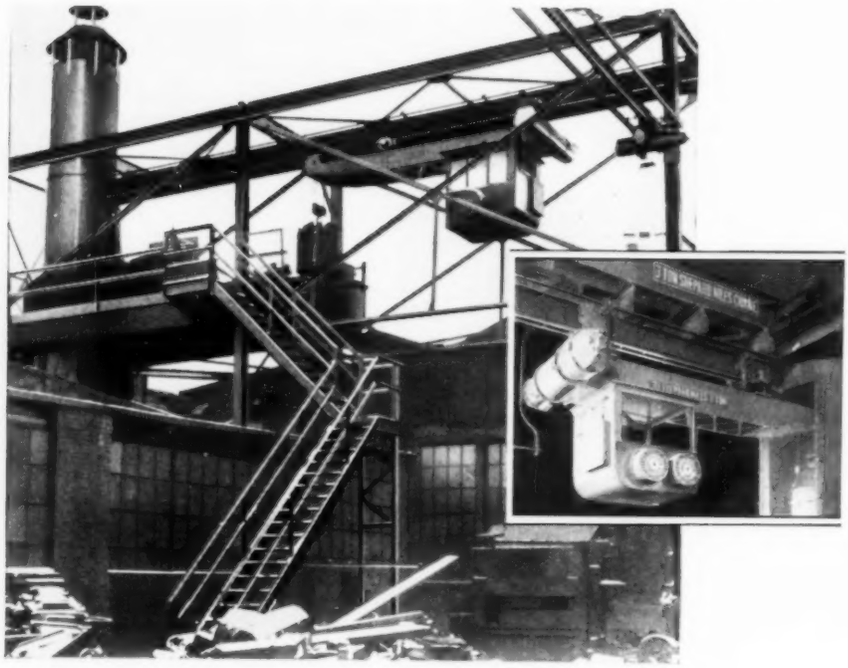
* * *

Frank Myers, 59, president-treasurer and general manager, Poughkeepsie Foundry & Machine Co., Poughkeepsie, N. Y., died at his home in that city recently. Mr. Myers was born in Poughkeepsie and attended the public schools there. He began working for the foundry company at the age of 11 as an office boy, later becoming

(*Concluded on page* 114)

BETTER CASTINGS AT LESS COST PER TON

... with SHEPARD-NILES CUPOLA CHARGING HOISTS



● Each charge is lowered in place, not dropped. Uniformly layered charges insure more even distribution of heat. Expensive charging floors are eliminated. Cupolas are charged faster and with fewer men LESS cost per ton.

A COMPLETE LINE OF CRANES & HOISTS

SHEPARD NILES CRANE & HOIST CORP.

360 SCHUYLER AVENUE... MONTOUR FALLS, N. Y.

GLOBE

A Standard for Comparison

It takes more than verbal claims to establish any product as a leader in its field. It takes years of experience in manufacture,—years of service under all conditions.

1939 marks the thirty-second year of Globe service to the foundry industry. All of the major improvements in shot manufacture during that time have been Globe developments.

Extravagant claims of "new and better", "hardest", "toughest" and vague references to "special treatments" and "special alloys" mean nothing to experienced shot users. They know the answer lies in operating results over a period of time. That is why experienced users prefer Globe.

THE GLOBE STEEL ABRASIVE CO., MANSFIELD, OHIO

H.C. CHILLED GLOBE SHOT

SHOT

TIECO FOUNDRY LADLES

• TIECO *geared ladles* eliminate all trouble from binding or sticking gearing. This patented feature of TIECO ladles assures accurate pouring, no drops, no jerks, and exceptional long life. Removes all trouble due to distortion or springage of the Bail or Bowl or both from heat. Furnished for manual or electrical operation. *TIECO ladles come in all types and sizes.* Descriptive literature on request.

THE INDUSTRIAL EQUIPMENT COMPANY
115 OHIO STREET · MINSTER, OHIO

WALNUT SHELL
PARTEX
FOUNDRY PARTING

Product of
Agicide Laboratories

Milwaukee, Wisc. 4668 N. Teutonia | FOUNDRY DIVISION | Los Angeles, Cal. 4549 Bandini Blvd.

PARTEX, a dry organic foundry parting, is the spherical particles of clean, hard, pulverized English Walnut Shells correctly graded and processed.

Please send us, without obligation, samples of Partex in standard shaker bags.

NAME _____

ADDRESS _____

CITY _____ STATE _____

bookkeeper. From 1923 to 1933 he was secretary-treasurer of the company and since that time has served as president.

* * *

Erick O. Sjoden, 72, former official of American Radiator Co. died recently at his home in Buffalo. Mr. Sjoden was born in Stockholm and came to the United States as a young man. After several years engaged in the manufacture of radiators in Titusville, Pa., he went to Buffalo in 1901 to become connected with the American Radiator Co. In 1919 he was made superintendent, Elmwood avenue equipment plant and 4 years later was appointed manager. Mr. Sjoden retired in 1930.

* * *

Charles B. Murray, 72, widely known in the chemical, metallurgical and mining engineering fields and president and treasurer, Crowell & Murray, Inc., Cleveland, was killed by an automobile recently. Mr. Murray was born in Worcester Mass., April 6, 1866 and graduated from Worcester Polytechnic institute in 1887. In recognition of his achievements, the institute on the 50th anniversary of his graduation awarded him an honorary doctor of engineering degree. Following graduation Mr. Murray became assistant chemist for Joliet Steel Co., Joliet, Ill. After working for several other steel companies he was appointed chief chemist and metallurgist at the Johnson works, of the then Carnegie Steel Co. In 1904 he formed his own commercial laboratory in Pittsburgh and continued there 3 years. He then came to Cleveland to form his concern with Mr. Crowell, and had been active in that company up until the time of his death.

* * *

W. E. Lewis, 68, for the past 6 years resident manager, Addyston works near Cincinnati, United States Pipe & Foundry Co., East Burlington, N. J., died Feb. 5 after a short illness. Mr. Lewis had been an employe of the company 45 years, part of the time as resident manager, Anniston, Ala., foundry.

* * *

Maj. Matthew J. Hoff, 50, former vice president and general manager, Great Lakes Malleable Co., Milwaukee, died March 30 after an illness of 7 years. He was an engineering graduate of Cornell university in 1912 and after serving in the World war joined the Milwaukee firm being active in its affairs until ill health caused his retirement in 1932.

* * *

Charles F. Heywood, Burnside Steel Foundry Co., Chicago, died March 31 in that city. Mr. Heywood was born Nov. 25, 1869 in Troy, N. Y. and at the age of 13 went to work in Burden's Iron Co. Inc., in that city. He went to Chicago when he was 20 to take the position of assistant foreman in the finishing department of what now is the Melrose Park works of National Malleable Castings Co. where he remained for 23 years through several changes in ownership. He rose to the position of finishing department foreman and then assistant superintendent of the plant. Mr. Heywood left National Malleable in 1910 to become manager of the Hubbard Steel Foundry, East Chicago, Ind. From 1913 to 1918 he was superintendent, McConway-Torley Corp., Pittsburgh. Returning to Chicago in 1918 he became manager of the foundry division, McCord Co. plant in West Pullman, Ill. where the company was making aerial bombs for the government. From 1921 with two interruptions he has been with the Burnside company.

The Sixth International Heating and Ventilating exposition will be held at Cleveland, Jan. 22-26, 1940. The exposition will be under the auspices of the American Society of Heating and Ventilating Engineers and will coincide with the forty-sixth annual meeting of the society.

5 ADVANTAGES OF TRUSCON STEEL FLASKS

1-**DURABILITY:** Truscon Flasks are made of one piece of steel.
2-**RUST-RESISTING:** Truscon Flasks are made of copper-bearing steel which resists rust and corrosion.
3-**STRENGTH:** Deep ribs and flanges extend full depth all around for maximum rigidity. This gives great strength with light weight, thereby reducing handling costs.
4-**ANY SIZE, SHAPE AND THICKNESS** of flasks can be furnished due to Truscon principles of design.
5-**ECONOMY:** Improved and enlarged manufacturing facilities reduce production costs. Savings reflected in lower prices to customers than would be possible otherwise.

• *Send for complete catalog of Truscon Foundry Flasks which illustrates many standard types available for immediate shipment.*

TRUSCON STEEL COMPANY • FOUNDRY FLASK DIVISION
6100 TRUSCON AVENUE • CLEVELAND, OHIO
Subsidiary: Republic Steel Corporation

TRUSCON

COPPER-BEARING STEEL FOUNDRY FLASKS

For Snagging and Cutting-Off

MANHATTAN ABRASIVE WHEELS

Grind accurately at low cost with these even-wearing, high production wheels, engineered for the job by an experienced staff of specialists. Consult our

ABRASIVE WHEEL DEPARTMENT

THE MANHATTAN RUBBER MFG. DIVISION
OF RAYBESTOS-MANHATTAN, INC.
Executive Offices and Factories, 77 Townsend Street, Passaic, N. J.

SNOWDEN SAMUEL, *Pres.* S. A. COCHRAN, *Vice Pres.*

FRANK SAMUEL & CO., Inc.
Harrison Bldg., Philadelphia, Pa.

PIG IRON
Low Phos—English—French

ALLOYS
Ferro Manganese Silico Manganese
Ferro Silicon Ferro Chrome
Calcium Silicide
Calcium Manganese Silicon

MANGANESE ORE
Open Hearth Use—Blast Furnace Use

CHROME ORE
Lump—Ground

IRON ORES
Foreign

BRANCH OFFICES:
Boston, Mass. — 24 Alban Road
New York — 40 Exchange Place

Something NEW for Chaplet Users!

NOW . . . a flattened *COIL HEAD* shoulder radiator chaplet

In general use by several leading automotive and stove foundries for over a year, the new COIL HEAD chaplet has proven itself to be a really outstanding contribution to the foundry industry.

Formed from ONE piece, with reinforcing rib, this new chaplet is considerably more satisfactory for a great many types of foundry work. For one thing, the sand packs around it better, insuring sound core support. It saves the molder's time because it is easier to handle, and COIL HEADS will NOT nest.

Available in all required sizes in plain, electro-copper plated, and hot tin-dipped finishes. An exclusive, patented chaplet.

■ **SQUARE PLATE SHOULDER RADIATOR CHAPLETS, TOO!**
A standard item with us which has been supplied to foundries for years. A well-made chaplet available in all sizes and finishes.

We manufacture a complete line of forged head, double head and other standard style chaplets. Representatives conveniently located in all principal foundry centers.

Chaplet suppliers to foundries since 1890

CLEVELAND CHAPLET & MFG. COMPANY
P. O. Box 5877 • Cleveland, Ohio

Please Write for Samples!

FOUNDRY ACTIVITIES

NEENAH FOUNDRY CO., Winneconne avenue, Neenah, Wis., has been granted permits to construct a wall and a 3-unit addition to its foundry at a cost of $7800.

* * *

Ohio Steel Foundry Co., Lima, O., is leading the first eight contenders in the 6-month Allen county industrial safety contest, two months of which have passed. The company's 300 employes have a record of having worked more than 130,000 manhours without a reportable injury.

* * *

Operations of Lake Foundry & Machine Co., Muskegon, Mich., are being stepped up materially by releases on contracts recently received from two customers. One contract is for motor blocks for a large engine builder and the other is for 25,000 castings for a washing machine manufacturer.

* * *

C. & S. Foundry, formerly route 3, Puyallup, Wash., has moved to 3018 Chandler street, Tacoma, Wash.

* * *

Name of the Nonferro Foundry & Pattern Co., 1215 West Brancroft street, Toledo, has been changed to the France Foundry Co.

* * *

Bremen Gray Iron Foundry Inc., Bremen, Ind., has been formed by Harold S. Heckman, C. W. Kling and Ellis Brown, Bremen, with capital of $15,000 to operate a foundry.

* * *

Ideal Foundry Co., subsidiary of Republic Steel Corp. and formerly located at Beaver Falls, Pa., will be moved to Newton Falls. The company will occupy the old Newton Steel Co. plant.

* * *

Index of foundry equipment orders for March, according to a report of the Foundry Equipment Manufacturers' association, Cleveland, was 146.6 as compared with 135.3 in February and 114.6 in March,

(*Concluded on page* 118)

PUT YOUR CUPOLA ON

Terre Haute

SPECIAL FOUNDRY

COKE

Throughout the many years that Terre Haute Special Foundry Coke has been produced the producers have steadfastly endeavored to improve its quality to the very highest possible degree. Only the best grades of selected West Virginia by-product coking coals are used, resulting to users in better cupola practice, better melting ratios, better castings, lower costs, lower foundry losses, and satisfied customers, all of which further results in a greater volume of business and larger profits to the foundrymen using Terre Haute Special Foundry Coke.

Sold Exclusively by

REPUBLIC COAL & COKE COMPANY

General Offices: 8 South Michigan Ave., Chicago

DETROIT — PEORIA — ST. LOUIS — NEW YORK — INDIANAPOLIS — MINNEAPOLIS — MILWAUKEE

Manufactured at Terre Haute by

INDIANA GAS & CHEMICAL CORPORATION

"STRICTLY MERCHANT OVENS"

RAW MATERIAL PRICES
April 20, 1939

Iron		
No. 2 foundry, Valley		$21.00
No. 2 Southern Birmingham		17.00
No. 2 foundry, Chicago		21.00
No. 2 foundry, Buffalo		21.00
Basic, Buffalo		20.60
Basic, Valley		20.50
Malleable, Chicago		21.00
Malleable, Buffalo		21.50
Charcoal iron, furnace		25.00
Coke		
Connellsville beehive premium	$5.50 to	$6.30
Wise county beehive coke	5.50 to	6.50
Detroit by-product delivered		10.25
Scrap		
Heavy melting steel, Valley, No. 2	$13.25 to	$13.50
Heavy melting steel, Pittsburgh, No. 2	14.00 to	14.50
Heavy melting steel, Chicago, Auto No. 2	10.00 to	10.50
Stove plate, Buffalo	13.00 to	13.50
Stove plate, Chicago	7.50 to	8.00
No. 1 cast, mchy. New York	12.00 to	12.50
No. 1 cast, mchy., Chicago	11.50 to	12.00
No. 1 cast, Pittsburgh	14.50 to	15.00
No. 1 cast, Philadelphia	16.50 to	17.00
No. 1 cast, Birmingham	14.00 to	14.50
Car wheels, iron, Pittsburgh	15.00 to	15.50
Car wheels, iron, Chicago	12.25 to	12.75
Railroad malleable, Chicago	14.50 to	15.00
Malleable, Buffalo	13.50 to	14.00
Nonferrous Metals		**Cents per pound**
Castings copper, refinery		9.87½
Straits tin		47.50
Aluminum, 99 per cent		20.00
Aluminum, No. 12 (Secondary, standard)	12.50 to	13.00
Lead, New York		4.75
Antimony, New York		11.50
Nickel, electro		35.00
Zinc, East St. Louis, Ill.		4.50

Direct your DUST problems to PARSONS for a COMPLETE Solution

Parsons will "clear the air" for you in any dust situation. If the need calls for a dry type dust arrestor, Parsons has the leader in their Oval Bag line . . . . or, if the wet type is better suited to the job, Parsons builds the amazingly efficient Roto-Wash Arrestor.

Call on Parsons for a survey of your situation and recommendation as to the type and size of dust arrestor needed for thorough dust control at minimum cost. No obligation!

WET AND DRY DUST ARRESTORS

Parsons Oval Bag Arrestor serving sand-handling system, capacity 120,000 cu. ft. of air per minute.

COMPLETE PIPING AND EXHAUST SYSTEMS,
BLAST CLEANING BARRELS AND ROOMS,
Continuous Ridge Ventilators

PARSONS ENGINEERING CORPORATION
CLEVELAND, OHIO

GLUTRIN

"Don't Accept A Substitute"

GOULAC

Carried in stock by the leading Foundry Supply Jobbers.

ROBESON PROCESS COMPANY
AMERICAN GUM PRODUCTS COMPANY

General Offices:
500 Fifth Ave., New York City

CARLOAD SHIPMENTS:
GLUTRIN . . from AuSable Forks, N.Y. and Erie, Pa.
GOULAC . . from Erie, Pa.

POWERFUL
but light . . . .

UNITED STATES PORTABLE SURFACE GRINDER

Designed for fast, dependable work.

Model No. 2500

A **QUALITY** tool which does big things for you. It's ruggedly built but surprisingly light. Aluminum housings; air-conditioned; ball-bearings grease-packed in dustproof housings.
Full equipped.

Write for Catalog No. 54

THE UNITED STATES ELECTRICAL TOOL CO.
CINCINNATI, OHIO, U.S.A.

(*Concluded from page* 116)

1938. Index of shipments was 128.1 as compared with 112.2 in February and 99.4 in March, 1938.

* * *

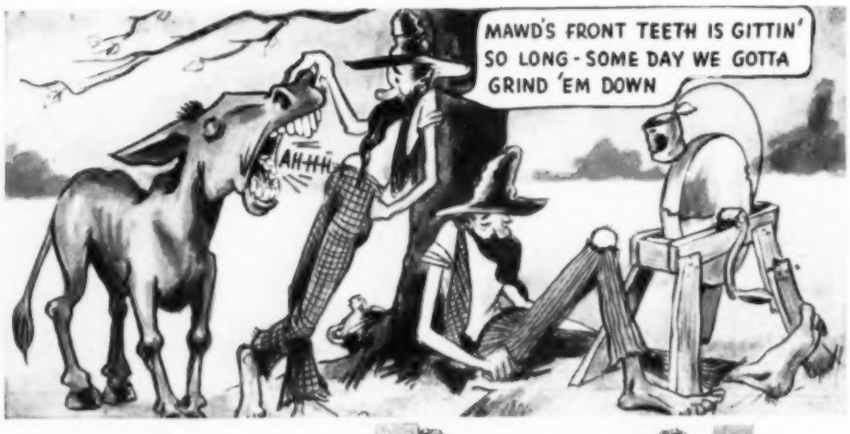
Meehanite Metal Corp., Pittsburgh, has granted license to manufacture meehanite metal to Lowes Foundry Co., Lower Hutt, New Zealand, and Booth-MacDonald & Co., Ltd., Christ-Church, Australia.

* * *

Star Machine Co. and Crescent Foundry Co., Amarillo, Tex., recently has changed its name to the Star Machine & Foundry Co. Management, company personnel and equipment and location will remain the same. Lowell Stapf is president.

* * *

Declines of 9 and 5 per cent characterized production of gray iron and steel castings during February according to reports received by the industrial research department of tht University of Pennsylvania from foundries in the third federal reserve district. A slight increase in jobbing and total production in the Reading area relieved the picture of decline in the gray iron foundries. Shipments were off in both types of foundries, but unfilled orders for iron castings rose 8 per cent while those for steel castings declined over 9 per cent. Stocks of raw material were generally smaller than at the end of last month.



Here's a

BETTER WAY

Type GPTA The Cincinnati Pedestal Grinder

. . . The Cincinnati General Purpose Grinders. They set a new high standard for economical production . . . Motors are fully enclosed, dirt and dustproof. Wheel guards fully enclosed and adjustable. Push button starter with overload protection. Extra heavy pedestal. Large tool tray and water pot.

Write for descriptive folder on THE CINCINNATI General Purpose Grinders and Buffers.

Electric Drills
Screw Drivers
Nut Setters
Tappers
Aerial Grinders
Tool Post Grinders
Bench and Pedestal Buffers
Bench and Pedestal Grinders
Abrasive Cut-off Machines

The Cincinnati

ELECTRIC DRILLS • GRINDERS • BUFFERS • PORTABLE TOOLS

The Cincinnati Electrical Tool Co.

DIVISION OF THE R. K. LE BLOND MACHINE TOOL CO.

2678-3 MADISON RD.
CINCINNATI, OHIO

Trade Publications

HEAT TREATING—Surface Combustion Corp., Toledo, O., has issued a 4-page bulletin on the application of its gas-fired tube heating elements for clean hardening, drawing, annealing, and normalizing furnaces.

REFRACTORY — Illinois Clay Products Co., Joliet, Ill., has issued a folder describing its fire clay products some of which include sand bonding material, refractory brick for furnace and general repair work and insulating brick.

FLUX — Krembs & Co., Chicago, has issued a 4-page folder containing a chart indicating which of its fluxes should be used with various metals. On other pages of the folder are listed the various fluxes manufactured by the company.

BEARINGS — Federal-Mogul Corp., Detroit, has published a 6-page booklet describing the properties of its bearings, bushings and bearing metals for industrial application. Production and testing methods as well as applications of its bearings and bushings are illustrated.

NICKEL — International Nickel Co., 67 Wall street, New York, has issued a data sheet relative to nickel cast iron. Three tables are given recommending the composition of gray iron to meet specification classes 25, 30, 35 and 40. Included are notes explaining the use of the tables.

NITRIDING—Nitralloy Corp., 230 Park avenue, New York, has published a 29-page booklet on "Nitralloy and the Nitriding Process" which gives data on compositions, proper condition of steel for nitriding, nitriding process, growth on nitriding, endurance and other properties of nitrided nitralloys.

SINTERING—Charles Hardy Inc., 415 Lexington avenue, New York, has issued a folder giving information on its high frequency electric induction furnaces for sintering metal powders. It is claimed that the furnaces reduces the time required for sintering to an extremely short period compared to usual methods.

STEEL — American Manganese Steel division, American Brake Shoe & Foundry Co., 389 East 14th street, Chicago Heights, Ill., has issued a 23-page booklet describing and illustrating laboratory procedures, production methods, and finished products. Included are analyses of some of the company's alloys and their representative uses.

CADMIUM PLATING—E. I. du Pont de Nemours & Co., Wilmington, Del., has issued a service manual on its salt for cadmium plating. The text in this 12-page booklet cites recent improvements and changes in the product, and gives detailed operating instructions and methods of analysis. A table of costs and time required for specified deposits is included.

REFRACTORY MATERIALS — Johns-Manville Co., New York, has issued a 20-page engineering data book which presents full information on the company's line of refractory products. Descriptive material includes data on the character or base of each product, its highest working temperature, number of pounds needed to set 1000 brick or form 1 cubic foot of construction, and the form in which the product is furnished.

CONVEYORS—Cleveland Crane & En-

(*Concluded on page* 120)

Foundrymen!

The increasing use of "Lawco Bond Clay" in Steel, Grey Iron, and Malleable plants over the past 10 years, has proved its suitability beyond a doubt.

●

Agents in Detroit, Chicago, Cleveland, Buffalo, Columbus and Youngstown.

LAWCO BOND CLAY

THE LAWRENCE CLAY COMPANY
JACKSON, OHIO
Mines and Mills — Lawco, Ohio

Blaw-Knox Hook-On Buckets are made in two types for foundry service, the regular and the "Foundry Type" which is built especially to meet the requirement of limited head room clearance, both multiply the value of your crane investment. Ask for Catalog 1224.

BLAW-KNOX *Digging and Rehandling* **BUCKETS**
BLAW-KNOX DIVISION
• OF BLAW-KNOX CO. •
Farmers Bank Bldg. Pittsburgh, Pa.

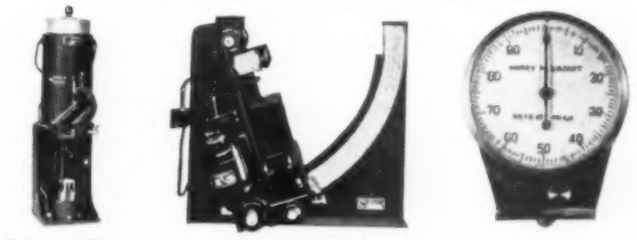
DIETERT DETROIT

MOISTURE TEST

Balance — *Moisture Teller* — *Sand Rammer*

The Moisture Teller is the practical moisture test for either the shop or laboratory.

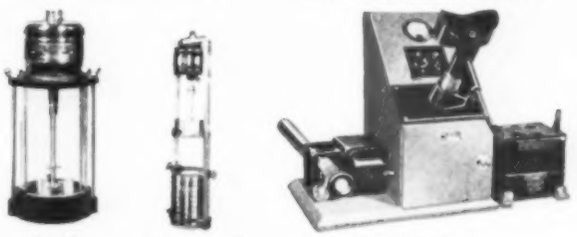
PERMEABILITY — STRENGTH — MOLD HARDNESS TEST



Permeability Meter — *Universal Sand Strength Machine* — *Mold Hardness*

Control your molding sand and molds to secure better castings at a lower cost.

FINENESS TEST — SINTERING TEST



Sand Washer — *Sieves and Sifter* — *Sintering Tester*

It pays to obtain the percentage clay substance and fineness of molding sands and core sands

Sintering temperature is very important to determine the refractoriness of molding materials.

MODERN ANALYSIS

Carbon Determinator

Your laboratory needs modern analysis to make speedy returns.

Accurate carbon determinations made in two minutes with the Carbon Determinator.

Accurate sulphur determinations made in five minutes with the Sulphur Determinator.

Accurate spectrographic analysis of metals in eight minutes and less.

HARRY W. DIETERT CO.
9330 Roselawn Ave.
DETROIT, MICH.

(*Concluded from page* 118)

gineering Co., Wickliffe, O., has issued a folder containing illustrations on applications of its product, Cleveland tramrail. The folder is entitled, "Avoid Damage Waste, Use Your Ceiling."

SAFETY—American Iron and Steel institute, 350 Fifth avenue, New York, has published a 20-page book "Safety in Steel" describing the strides made in safety in the steel industry during the years 1934 to 1937.

WELDING SHIELD—Mine Safety Appliances Co., Braddock, Thomas and Meade streets, Pittsburgh, has issued bulletin No. CE-6 describing its recently developed welding skuligard and welding shield combination.

PIPES—M. B. Skinner Co., South Bend, Ind., recently published catalog No. 38A. Nine different styles of pipe repair clamps for stopping leaks without replacing pipes are shown, together with a leak-loss chart.

WELDING—Catalog No. 22 recently has been published by the Air Reduction Sales Co. 60 East Forty-second street, New York. The catalog includes descriptions and illustrations of welding and cutting apparatus and supplies.

HEATING—General Electric Co., 4966 Woodland avenue, Cleveland, recently published a 5-page booklet, GES-1892 describing its line of unit heaters. Eleven different applications are described including heating, melting and drying.

MATERIALS HANDLING — Link-Belt Co., Chicago, has published a 23-page book containing reprints of recent advertisements directed to the foundry industry. It covers materials handling and sand preparation equipment.

CLEANING COMPOUND—Oakite Products Inc., 22 Thames street, New York, has issued an 11-page booklet describing the various applications of its cleaning compounds and methods covering all phases of industrial sanitation.

COMPRESSOR—New heavy duty diesel engine driven compressor has been introduced as described in a 16-page bulletin, Form 3072, by Ingersoll-Rand Co. Inc., 11 Broadway, New York. Diagrams of the construction of the compressor are included.

CLEANING — A folder describing and illustrating four new pieces of equipment has been published by the American Foundry Equipment Co., 549 South Byrkit street, Mishawaka, Ind. Descriptions of two tumblasts, one tablast and a sandcutter are included in the folder.

RESURFACER — Flexrock Co., 800 North Delaware avenue, Philadelphia, has issued a folder describing the application of Ruggedwear to rough floor surfaces. Illustrations of its applications and reproduced photographs of floors resurfaced by the product are given.

CONVEYORS — Chain Belt Co., Milwaukee, has issued a folder, bulletin No. 332, describing its apron and pan conveyors. Drawings of six types of conveyors are given and pictures illustrate their applications. Cross sectional views and capacity tables are included.

PUMPS—Specifications and diagrams together with reproduced photographs describe the single acting power pumps manufactured by Worthington Pump & Machinery Corp., Harrison, N. J. in folder W-423-B5 issued recently by that company.

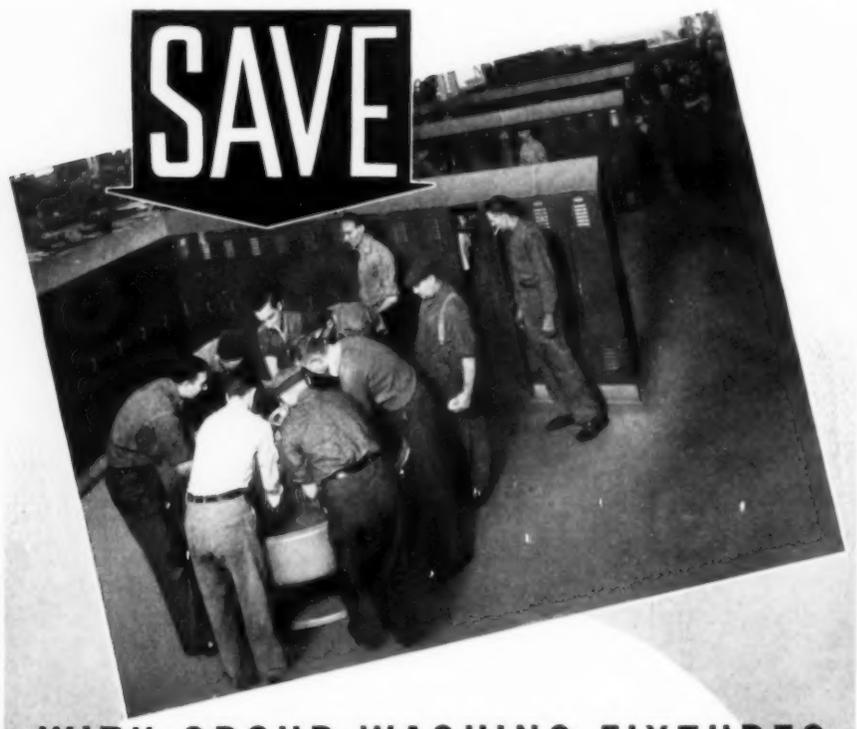
LUBRICATION—E. G. Acheson Ltd., Thames House, Millbank, London, England, has published a 6-page bulletin on "The Value of Colloidal Graphite for Assembly and Running-In" which describes experimental facts on wear of bearings, and the application of its colloidal graphite in improving wear resistance.

CONVEYORS — Palmer-Bee Co., Detroit, has issued a 48-page book illustrating its manufacturing facilities and many of its products and installations. The installation views show a wide range of materials handling methods which might suggest solutions to like problems in other industries.

REFRACTORY — Bulletin No. 327-C of 8 pages describing the applications of insulag has been published by the Quigley Co., 56 West Forty-fifth street, New York. Efficiency of the insulation is demonstrated by charts, and the wide variety of its application shown by reproduced photographs of installations. A list of other company products is included.

RECORDERS — C. J. Tagliabue Mfg. Co., Park and Nostrand avenues, Brooklyn, N. Y., has issued an 11-page bulletin, No. 1178, describing its new line of 9-inch recording and controlling instruments for temperature and pressure. Construction features are shown, specifications are given and samples of charts illustrated for 9-inch mercury and gas filled ranges.

PROPERTIES—Development and Research division, International Nickel Co. Inc., 67 Wall street, New York, has made available a 19-page bulletin entitled, "Engineering Properties of Nickel." It discusses composition, physical constants, mechanical properties, corrosion resistance, working instructions, description of mill products, castings, and special nickel alloys.



WITH GROUP WASHING FIXTURES

Save Workers Time—Promote Cleanliness—Aid in Reducing Dermatoses—Keep Men on the Job —Save Space, Water, and Installation Expense

● As many as 10 men can wash *at one time* in the clean, running water—yet each Bradley requires no more piping connections than one *single* wash basin!—one hot water, one cold water and one drain connection. Installation and maintenance expenses are reduced —70% less water is consumed. . . . Without obligation, experienced washroom consultants can help you—suggest arrangements for new or existing buildings. Bradleys will pay for themselves out of *savings* —as pointed out in our Catalog 937. As a first step, let us mail you a copy. . . . BRADLEY WASHFOUNTAIN CO., 2217 W. Michigan St., Milwaukee, Wis.

BRADLEY WASHFOUNTAINS

Plans and ideas for washrooms will be furnished by Bradley Washroom Consultants. Our free Catalog mailed also on request.